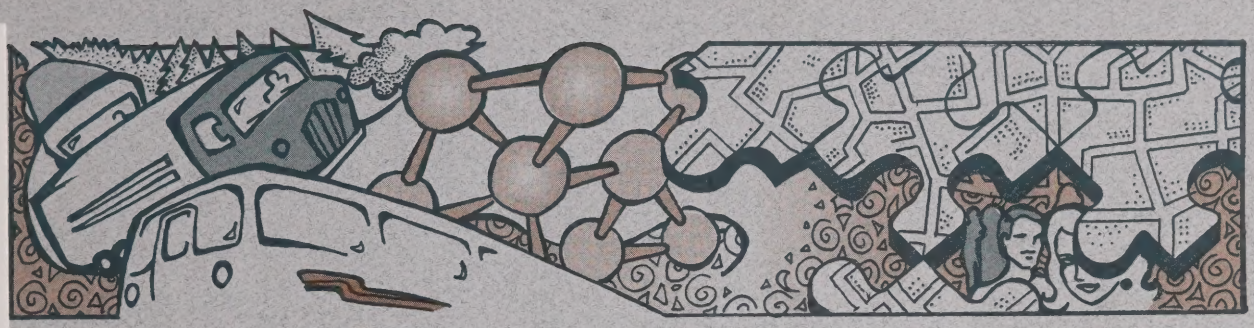


GTA 2021 - INFRASTRUCTURE

Report of the Provincial - Municipal Infrastructure Working Group

DISCLAIMER RE WORKING GROUP REPORTS

Six groups were established in November 1991 to study issues and provide advice in the following areas: Urban Form, Countryside, Human Services, Infrastructure, Economic Vitality and Investment Planning and Financing Mechanisms.

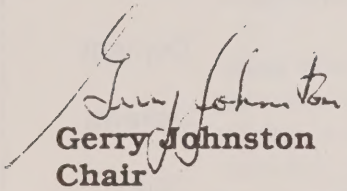
The reports which have been produced by these groups will be used as background information during a lengthy period of public discussion and refinement. The reports represent the work and advice of individuals chosen by their ministry, municipality or organization for their knowledge of their particular subject area. The reports represent a consensus of the group and as a result do not necessarily represent the opinions of individual members of the group.

The reports and their options and recommendations were produced for discussion purposes only. They are <u>not</u> representative of Provincial policy nor do they represent the policy of individual provincial ministries or municipalities.

Acknowledgements

It is my pleasure to table the final report *GTA 2021 Infrastructure Requirements*. I would like to acknowledge the work of each and every member of the Infrastructure Working Group (list of members follows) for their contribution in this exercise. My special thanks to the Chairs of the two subcommittees, Kees Schipper (Transportation Subcommittee) and George Mierzynski (Services Subcommittee).

I would also like to extend my appreciation to Neal Irwin and Ewen Fisher of IBI Group for their expert advice and valuable assistance in coordinating, compiling and editing the report.



Gerry Johnston
Chair
Infrastructure Working Group

INFRASTRUCTURE WORKING GROUP

CHAIR
Gerry Johnston
Ministry of Transportation

STAFF: Barbara Breston Ministry of Transportation
Hans Kuhlmann Office for the Greater Toronto Area

TRANSPORTATION SUBCOMMITTEE

Kees Schipper (Chair)	Mississauga
John Barnes	York
Dan Van Bielen	Brampton
Doug Bleaney	Scarborough
Bob Boyle	GO Transit
Mary Kim Cichocki	TTC
Thomas Denes	Etobicoke
Richard Gordon	Metro
Doug MacCallum	Min. of Energy
Tom Mulligan	Metro
Tony Prevedel	Durham
Ric Robertshaw	Halton
Doug Thwaites	Peel

SERVICES SUBCOMMITTEE

George Mierzynski (Chair)	Min. of Environment
Joe Amodeo	Peel
Bruce Bowes	Aurora
Gerald Desjardins	Metro
Chang Lee	Durham
Patrick Lee	Oshawa
Bruce Macgregor	York
Ric Robertshaw	Halton

GTA 2021
INFRASTRUCTURE REQUIREMENTS

ABSTRACT

The Infrastructure Working Group has assessed the transportation and water/sewer infrastructure requirements required to serve and help shape the Nodal land use concept as broadly defined by the Urban Form Working Group. Findings are presented in this report, organized into three parts, which are summarized briefly below and more fully in the report's initial section entitled Overview: Strategic Directions.

PART 1: THE CONTEXT

The most important ideas expressed in Part 1 can be summarized as follows:

- **infrastructure benefits of the Nodal land use concept** are particularly important for transportation in terms of reduced overall travel effort and dependency on the private automobile, and encouragement of public transit, walking and cycling;

- **factors influencing infrastructure demand and costs**, in addition to urban form, include demographic and economic trends, networks and service levels, and infrastructure system management measures which can affect overall demand levels, peaking of demand and, for transportation, demand allocation among travel modes;

- **using existing infrastructure as efficiently as possible** is an essential first step in expanding the system capacity including cost-based user pricing, which can greatly influence user behaviour while also providing an improved basis for dedicated financing of infrastructure maintenance and expansion;

- **integrated planning/delivery of land use and infrastructure** is required, to achieve both the Nodal land use concept and effective and efficient infrastructure systems which will serve and help shape the land use concept.

PART 2: TRANSPORTATION

- a **transportation vision** is set out (Exhibit 2.6) which involves substantial expansion of the rapid transit network, major service improvements/extensions in the commuter rail network and selected expansion of the network of highways and arterial roads;

- the vision will provide **high capacity radial rapid transit links** between all five major nodes in the Nodal concept and the Metropolitan Central Area and **crosstown/circumferential rapid**

transit routes tying the major nodes to each other and to other, intermediate nodes which were not explicitly defined by the Urban Form Group;

- the most immediate requirement is to obtain **a commitment by all relevant governments and agencies to the Nodal land use concept and to mechanisms for coordinated planning and delivery of both land use and transportation**, including planning, zoning, corridor protection and infrastructure design/implementation to achieve the fundamental change from **Spread** to **Nodal** urban development;

- **transportation management measures, in addition to those already in effect, should be implemented on a high priority basis.** Particularly important in the short term (5-10 years) are transit priority measures and HOV lanes; transit fare integration and service coordination; improved transportation communications, control and management systems; and integrated pricing and tax structures for transit and related parking; in addition, **continuing improvement and integration of the surface transit network is essential**;

- **in the longer term, in addition to the above, further system optimization actions are required** regarding benefit sharing (mixed government/landowners financing of transportation facilities); increased dedication of existing user charges for transportation system funding; introduction of direct congestion pricing for road use; use of dedicated revenue streams for commercial bond financing of transportation facilities; greater involvement of the private sector for more efficient delivery of services; and design/modification of taxes and subsidies to encourage efficient provision/use of the transportation system;

- **short term rapid transit expansion elements** (initiated in the next 10 years) include an extensive express bus network using HOV/transit priority lanes; rapid transit extensions to the Mississauga and Langstaff nodes; commencement of the Eglinton RT west of the Spadina line, the Sheppard line east of the Yonge line, and the Mississauga Transitway west of the City Centre; and extensions of the Central Waterfront LRT to the west and east as required to serve waterfront land use;

- **short term commuter rail improvements** include all-day service on six of the seven existing GO rail lines; initiating GO service on the CP North Toronto subdivision; relocating/creating GO stations; and protecting four additional lines for possible future service;

- **short term highway improvements** include constructing Highway 407 from Highway 410 to Highway 404; Highway 401 widening in Durham, Peel and Halton regions; Highway 404 widening in north

Metro and south Durham region; extension of Highway 403 through Halton region; improved design/operation of highways and arterial roads for increased transit/HOV use; and widening/extension of arterial roads as required to serve land uses and provide multi-mode functions to carry **people** and **goods** as efficiently as possible rather than focussing just on automobiles and trucks;

- **early corridor protection** is required for all links in the transportation vision, including a possible east-west utility corridor in central York region;

- **in the longer term, remaining links in the transit and commuter rail networks should be implemented plus completion of the highway and arterial road network** and continuing improvement of highways and arterial roads to achieve increased transit/HOV use and expanded multi-mode functions;

- **continuing emphasis on integrated land use/roads/transit planning and delivery is required;**

- **there should be early initiation of studies and actions to define the transportation system and protect future corridors required to achieve the vision.**

Transportation System Costs

As shown more fully in Exhibit 2.11 (Section 2.6.3) the estimated capital costs for short term system expansion elements are as follows: (expressed in billions of 1991$):

Rapid Transit	$ 5.8
Commuter Rail	$ 0.8
Highways and Regional Roads	$ 4.6
Short Term Expansion Totals	$11.2

Estimated capital costs for projects initiated beyond the coming 10 years are broadly as follows:

Rapid Transit	$13.6
Commuter Rail	$ 3.4
Highways and Regional Roads	$ 6.4
Longer Term Expansion Totals	$23.4

The total capital budget for transportation system expansion is therefore estimated to be some $34.6 billion.

PART 3: WATER/SEWER SYSTEMS

As discussed in Part 3, there are opportunities to maximize the utilization of existing water and sewer systems in the GTA as follows:

- **a unified commitment to water conservation measures throughout the GTA;**
- **the introduction of full cost-based pricing;**
- **the use of growth management strategies** which encourage locating the growth of people and jobs in areas where there is available water and sewerage capacity;
- **inter-regional cooperation to utilize existing capacities in order to resolve deficiencies;**
- **water and sewerage systems management measures** aimed at increasing throughput with minimum capital investment.

These measures will have a direct impact on the magnitude of new capital investments in water and sewer improvements that will be required to support nodal development. Accordingly, these initiatives represent an important priority in the planning and development of water and sewer infrastructure over the short term and the long term.

WATER/SEWER SYSTEM COSTS

At present, some $350 million per year is being invested by the regions in trunk water and sewer infrastructure. These expenditures are aimed at expanding capacities through to the turn of the century and beyond, and in meeting evolving environmental standards.

During the *GTA Urban Structure Concepts Study*, broad capital cost estimates were prepared for expanding the trunk water and sewerage systems to the year 2021 to serve a GTA population of 6 million people and total GTA employment of 3.4 million jobs. The cost estimates to expand the trunk water and sanitary sewerage systems for the Nodal concept totalled $3.5 billion to provide the required 2021 capacities. In addition, the local land development costs including the grading of development areas, installation of local water and sewer services, stormwater management, and installation of local electric power service, street lighting, streets and sidewalks amounted to $11 billion. The Nodal concept involved substantially reduced land development costs compared to the Spread development concept (which would reflect existing trends) with the cost savings amounting to $4.7 billion by the year 2021.

NEXT STEPS

The next steps in moving to achieve the GTA vision are seen to be as follows:

- **public consultation leading to consensus on the vision and associated infrastructure requirements;**

- **establishment of a provincial/municipal mechanism to determine infrastructure and development priorities in the GTA context;**

- **streamlining of the Environmental Assessment and planning approvals process, for example by integrating the planning and Environmental Assessment process;**

- **more detailed planning/analysis/design and implementation of the higher priority elements;**

- **development and application of infrastructure financing mechanisms such as public/private funding partnerships and capital financing based on dedicated user revenue streams.**

The latter point is particularly important **to provide the financial capability necessary for achieving the extensive infrastructure improvements described in this report and for ongoing maintenance and rehabilitation of the infrastructure systems.**

* * *

The findings and proposals summarized above and described more fully in Parts 1, 2 and 3 of the report, are respectfully offered by the Infrastructure Working Group as a basis for immediate and sustained action to achieve the GTA vision.

Table of Contents

Table of Contents (Cont'd)

Table of Contents (Cont'd)

List of Exhibits

Appendix

A. Existing Transportation Deficiencies

GTA 2021
INFRASTRUCTURE REQUIREMENTS

OVERVIEW: STRATEGIC DIRECTIONS

INFRASTRUCTURE WORKING GROUP

MARCH, 1992

1. A BASIS FOR DECISION MAKING

As described in Parts 1, 2 and 3 of this report, the Infrastructure Working Group has assessed the transportation and water/sewer infrastructure requirements to serve and help shape the Nodal land use concept as broadly defined by the Urban Form Working Group.

PART 1: THE CONTEXT

Part 1 of the report describes the context of this work in terms of earlier reports, GTA policy objectives as recently documented by the provincial government, major factors and trends affecting infrastructure demand, efficiency and effectiveness, the Nodal development concept, and broad comments on other infrastructure (e.g. for solid waste and stormwater management, energy, schools and hospitals) which were treated more generally, for reasons outlined in Section 1.3.3.

The most important ideas expressed in Part 1 can be summarized as follows:

- **Infrastructure Benefits of the Nodal Land Use Concept**: achieving more structured, compact and mixed land use, as in the Nodal concept, is essential as a means of reducing overall travel effort and dependency on the private automobile; encouraging the use of public transit, walking and cycling; and enabling transit services to be provided efficiently and effectively throughout the GTA. Benefits relating to water/sewer infrastructure are less pronounced.

- **Other Major Benefits of the Nodal Concept:** the Nodal development concept can also provide substantial additional benefits, not directly related to transportation and water/sewer infrastructure, including more diverse and lively communities, maintenance/enhancement of environmental quality, reduced consumption of farmland for urban purposes, and reduced energy consumption.

- **Factors Influencing Infrastructure Demand and Costs:** in addition to achieving the Nodal land use concept, there are a number of factors which will have a critically important impact on the overall demand for transportation and water/sewer services, the peaking of demand (which has a major impact on system design and cost) and, in the case of transportation, the allocation of demand among travel modes (which affects greatly the efficiency and cost of providing transportation services).

- **Using Existing Infrastructure As Efficiently As Possible:** system management - including levels of service provided, operational /information/control measures and (most fundamentally) prices directly paid by users of the transportation and water/sewer systems - can have a major impact on user behaviour and system expansion requirements. Such measures should be widely and effectively applied in support of Nodal development before extensive system expansion is carried out.

- **Integrated Planning/Delivery of Land Use and Infrastructure:** transportation and water/sewer facilities and services are fundamental

determinants of land use development patterns and it is critically important that decisions regarding the planning, staging and management of these basic infrastructure systems be closely integrated with planning and delivery of the Nodal urban development concept and related community, environmental, economic and financial factors.

PART 2: TRANSPORTATION

Part 2 of the report deals with transportation, addressing the importance of transportation to the GTA, existing deficiencies, major facilities and planned expansion, transportation principles and major issues, and major transportation needs and improvement options. Part 2 concludes by describing a transportation vision for the GTA and proposes transportation policies and priority actions to achieve the vision. These actions are prioritized in terms of short term and longer term initiatives, and the cost implications for each set of initiatives are broadly estimated. Further work required to analyze, plan, design and implement the various initiatives is also outlined.

PART 3: WATER AND SEWER SYSTEMS

Part 3 presents similar information and findings regarding water and sewer systems, in terms of existing major facilities and planned expansion, capital budgets for planned expansion, infrastructure requirements to support the GTA vision, and proposed water/sewer policies and priority actions.

The following three sections provide a brief synthesis and summary of the findings and proposals of the infrastructure Working Group, aimed at providing a basis for decisions which will be vital to the success of the GTA vision.

2. INFRASTRUCTURE IMPACTS ON NODAL PRIORITIES

Before summarizing the infrastructure priorities and costs as proposed by the Working Group, it is important to address broadly the extent to which some parts of the Nodal land use concept could be achieved based largely on available capacity of the existing transportation and water/sewer systems and, conversely, the extent to which significant growth of some nodes could not be achieved without major infrastructure expansion.

As shown in Exhibit 1.5, the Nodal land use concept includes five major nodes in addition to the Toronto Central Business District (CBD), plus 23 intermediate nodes. Five of the latter (North Oakville, Brampton, Vaughan, Langstaff and Markham) had originally been designated by the Urban Form Working Group as major nodes at the time the Infrastructure Working Group was preparing this report. Accordingly, the discussion which follows focusses on the above ten nodes, plus downtown Toronto, a total of eleven nodes. All five of the major nodes (Etobicoke, Mississauga, North York, Oshawa and Scarborough) are located within existing built-up and established urban areas; the other five nodes, while centred on existing communities of long standing, are surrounded by a more suburban condition involving rapid population growth which has tended to be largely on new (greenfields) land. Of those, the latter four nodes (Brampton, Vaughan, Langstaff and Markham) differ also in that they are farther from Lake Ontario than the more urban nodes which, in some cases, raises questions of water/sewer servicing capacity, at least in the near term. Plans currently being developed for the Toronto Central Area and Central Waterfront suggest that, in addition to substantial employment growth, this preeminent node will also experience population growth in the range 100,000-250,000 over the next 30-40 years.

2.1 TRANSPORTATION SYSTEM

The major nodes which are least likely to experience short term growth constraints from the transportation viewpoint are those which are directly located on the existing rapid transit and commuter rail system: downtown Toronto, North York, Scarborough and Etobicoke (the latter node is centred on Bloor/Kipling). While there are local traffic constraints requiring continuing attention in each of those nodes (particularly North York and Etobicoke where significant road improvements will be needed), the expansion capability of rail transit is such that they may be more capable than the others of substantial short term growth in the absence of significant system expansion initiatives (e.g. new links).

The other seven nodes (Markham, Mississauga, Oshawa, Langstaff, Vaughan, Brampton and North Oakville) are all in locations which can be served by an extensions of the rapid transit system and/or links to the GO Transit commuter rail system. Markham could be directly served by local transit shuttle service from the City Centre to the Stouffville GO line and an extension of the Scarborough Rapid Transit line; the Mississauga City Centre could be served by a rapid transit extension from the Bloor subway and by the Mississauga Transitway as well as by local transit shuttle service to the Milton GO line; Oshawa is served by the GO Lakeshore East line and will be more effectively served when service frequency is increased and the extension to a new station at Harmony Road and local transit connections are more fully in place; Langstaff could be directly served by an extension of the Yonge subway and by enhanced service on the Richmond Hill GO line; and Vaughan could be served directly by GO service on the MacTier line, an extension of the Spadina rapid transit and/or transit shuttle service to the Bradford GO line. GO service to the Brampton node can be increased, and North Oakville can be served by a shuttle to the Oakville GO station and High Occupancy Vehicle (HOV) lane or transit priority lane bus service on Highways 5/403 which could be upgraded later to higher-order rapid transit such as a busway. In addition, the nodes at North Oakville, Mississauga, Brampton, Vaughan, Langstaff, Markham, Scarborough and Oshawa could be tied together by a circumferential express bus service, initially HOV/transit priority lanes on Highways 5/403, 10/410, 7/407, 48 and 2/401, in the longer term, by higher-order transit services which could take the form of busways or rail RT.

All eleven of the nodes discussed above (as well as the remaining 18 intermediate nodes) are, of course, served by the road network, including regional arterial roads providing, in most cases, relatively short connections to existing or planned highways in the 400-series network. Highway 407 will eventually provide significant highway capacity increases serving the intermediate nodes in the Highway 7/401 corridor (Brampton, Vaughan, Langstaff and Markham), and widening of Highway 401 will increase road capacity serving Oshawa. It is apparent, however, that major increases in road capacity are not feasible in the urbanized GTA, except as required for goods movements, transit, pedestrians/cyclists and essential auto traffic, because of the community disruption, land requirements, energy consumption and environmental degradation resulting from major road system expansion and from current forms of automotive transportation. The obvious conclusion from this, and one that is embodied in existing government policies at both the provincial and municipal levels, is that future growth in transportation demand in the GTA will have to be served largely by expansion of the transit system.

This broad assessment suggests that all of the nodes located beyond the boundaries of Metropolitan Toronto will require significant rapid transit/commuter rail transportation improvements to support the growth concept proposed by the Urban Form Working Group. Extensions of the rapid transit system and shuttle connections to the nearest GO line are seen by the Infrastructure Working Group as the most direct way of achieving this, which also meets the

basic principle of achieving high-order rail transit connections between each major node and the Toronto CBD. Cross-town and circumferential rapid transit improvements will also be required, as outlined further in Section 4.3.1.

2.2 WATER/SEWER SYSTEMS

The Services Subcommittee concluded that existing servicing capacity and opportunity for near term (5-10 years) as well as longer term expansion are such that achieving growth objectives in all of the major nodes and most of the five intermediate nodes discussed above should be relatively unconstrained from the water/sewer servicing perspective based on regular system expansion over the coming decades.

The one exception is Vaughan which, along with Langstaff, Markham and other nodes in south York region, is served by the York-Durham sewer system and by water from the Metro Toronto system. Because of its location at the end of the York-Durham sewer, Vaughan will experience servicing constraints during the coming ten years if rapid growth is maintained, and significant system expansion will be required to meet its servicing needs. There are several alternatives for system expansion, including expansion of the York/Durham sewer system and/or development of new sewer capacity through Metro Toronto or the Region of Peel to the Lake. This will require more detailed study as a basis for the system expansion necessary to support Vaughan's growth as a node.

3. INFRASTRUCTURE PRIORITIES

Based on the objectives and principles enunciated in Section 2.3 for achieving the vision, existing information on system expansion requirements/opportunities and costs, and the judgement of its members, the Working Group proposes short term and longer term priorities for managing and expanding the transportation and water/sewer systems. These are summarized briefly below:

3.1 TRANSPORTATION SYSTEM

Integrated System Planning and Management

The most immediate requirement is to obtain a commitment by all relevant governments and agencies to the Nodal land use concept and the transportation vision - which is illustrated in Exhibit 2.6 and described in Section 2.5 - required to serve and shape it, and also a commitment to mechanisms for coordinated planning and delivery of both land use and transportation. The necessary planning, zoning, corridor protection and infrastructure design/implementation actions to that end must be initiated as quickly as possible in order to achieve the fundamental change from a **Spread** to a **Nodal** form of urban development. **This requires early initiation of studies and actions to define the transportation system more fully and to protect future corridors required to achieve the vision.**

Second, transportation management measures, in addition to those already in effect, should be implemented on a high priority basis. In the **short term** (implemented during the next 5-10 years) these include the following:

- transit priority measures and HOV/transit priority lanes;
- transit fare integration and service coordination;
- pricing structure for transit and related parking;

- employer tax break for subsidizing transit passes;
- transit communications and control systems;
- commuter rail enhanced service/integration/coordination;
- freeway traffic management systems;
- less on-street parking and loading;
- intersection improvements.

A sustained, ongoing commitment to integrated planning/delivery of land use and transportation and, within the transportation system, coordinated planning/delivery of roads and transit and a mechanism for more integrated planning, delivery and operation/pricing of transit services will be required. Other transportation management measures, with major implications for transportation financing and pricing, will require careful study in the short term for implementation in the **medium and longer term**:

- **benefit sharing**: mixed government/landowner financing of transportation facilities;

- **existing user pay**: increased **dedication** of existing user charges for transportation system funding;

- **extended user pay:** introduction of direct congestion pricing for roads use;

- **private sector involvement:** use of **dedicated** revenue streams for commercial bond financing of transportation facilities, and greater involvement of the private sector for more efficient delivery of services;

- **fiscal policy**: design and/or modification of taxes and subsidies affecting transportation users and providers, to encourage the achievement of the vision rather than working against it.

More details on these transportation management priorities are provided in Part 2, in particular Sections 2.4.2, 2.5.5, 2.6.1 and 2.6.2.

System Expansion

Reflecting the discussion in Section 4.2.1 and the report's overall findings, the Working Group recommends the following **short term** system expansion elements (construction to be initiated and, where possible, completed during the next 10 years):

- **selected links in the rapid transit vision**; e.g.: rapid transit extensions of the Bloor and Yonge lines connecting to the Mississauga and Langstaff nodes, respectively; HOV/transit priority lane express bus service connecting the nodes, as a precursor to higher-order transit links to be provided in the longer term; extensions of the Central Waterfront service to the west and east as required to serve waterfront land use; commencement of the Eglinton line from the Spadina line to the west Metro boundary; commencement of the Sheppard line from the Yonge line east to Victoria Park Avenue; commencement of the Mississauga Transitway from the Mississauga City Centre west to Winston Churchill Boulevard;

- **all-day service on six of the seven existing GO Rail lines** (excluding the Bradford line) and full service on parts of selected lines;

- **GO service on the North Toronto subdivision** of CP Rail serving the midtown area of Metropolitan Toronto and protection of other existing rail lines (MacTier, Havelock and Belleville subdivisions) for possible future service;

- **relocation and/or creation of new GO stations** integrated with the Nodal land use concept and with the rest of the transportation/transit systems;

- **higher-order transit to Pearson International Airport** and adjacent areas;

- **Highway 407 construction** from Highway 10 to Highway 404;

- **Highway 401 widening** from Neilson Road to Brock Road and from Highway 410 to Highway 25;

- **Highway 404 widening** from Highway 401 to Major MacKenzie Drive;

- **Highway 403 extension** through Halton region;

- **improved design and operation of highways and arterial roads for increased transit/HOV use** and, where appropriate, for pedestrians and cyclists;

- **widenings and extensions of the arterial road network both to serve developing land uses and to provide multi-mode functions** serving transit, trucks, pedestrians and cyclists as well as private automobiles;

- **protection for an east-west utility corridor in central York region** which could carry a possible freight rail bypass line, energy network links and possibly a highway;

- **corridor protection for all links in the transportation vision.**

In the **longer term**, the Working Group recommends the following system expansion elements:

- **all remaining links in the rapid transit vision network,** including RT extensions of the Spadina and Scarborough lines to the Vaughan and Markham nodes, respectively, completion of the full east-west lines in the Eglinton and Sheppard corridors; completion of the link from the Bloor line north to Pearson Airport and adjacent areas and further north to the Highway 407/7 corridor; completion of the Mississauga Transitway east of the City Centre linking to the Eglinton RT;

- **upgrading of HOV services** to higher-order rapid transit, including the circumferential line in the Highway 7/407 and Highway 10/410 corridors linking the Markham, Langstaff, Vaughan and Mississauga nodes and selective upgrading of HOV/transit lane services in the Highway 2, 5/403

and 11 corridors, connecting to the Oshawa and North Oakville nodes, respectively, and north to Newmarket;

- **further expansion to achieve full service on existing GO lines;** increased service frequency, beyond full service, on selected lines; possible electrification where economically justified;

- **selective commuter rail service on the protected links** in addition to the existing seven radial lines and the North Toronto subdivision;

- **completion of Highway 407** between Highway 403 in the west and Highways 115/35 in the east;

- **completion of the two north-south links connecting Highways 401 and 407 in Durham**;

- **northward extension of Highway 410 to Snelgrove**;

- **northward extension of Highway 427 and improvement of Highway 48**, both to the east-west utility corridor;

- **continuing improvement of highways and arterial roads to achieve increased transit/HOV use**;

- **continuing expansion of the arterial road network to serve ongoing land use development and improved multi-mode functions**;

- **continuing emphasis on integrated land use/roads/transit planning and delivery**;

- **early initiation of studies and actions to define the transportation system and protect future corridors required to achieve the vision.**

3.2 WATER/SEWER SYSTEMS

As discussed in Part 3, there are opportunities to maximize the utilization of existing water and sewer systems in the GTA as follows:

- **a unified commitment to water conservation measures throughout the GTA;**

- **the introduction of full cost-based pricing;**

- **the use of growth management strategies** which encourage locating the growth of people and jobs in areas where there is available water and sewerage capacity;

- **inter-regional cooperation to utilize existing capacities in order to resolve deficiencies;**

- **water and sewerage systems management measures** aimed at increasing throughput with minimum capital investment.

These measures will have a direct impact on the magnitude of new capital investments in water and sewer improvements that will be required to support nodal development. Accordingly, these initiatives represent an important priority in the planning and development of water and sewer infrastructure over the short term and the long term.

The following section summarizes the basic sewer and water infrastructure improvements by region.

Region of Halton

Water and sewer improvements in the Region of Halton include continuing expansion of the Burlington/Oakville water supply and pollution control plants. Integration of the Burlington and Oakville water systems will provide substantial benefits. Milton should be served by lake-based water and sewer systems rather than by the current stream-based water pollution control system and ground-based water supply. Servicing to Milton will require the development of a new water supply plant on the lakefront. There are a number of opportunities in the Region of Halton for possible joint servicing with the Region of Peel.

Region of Peel

Continuing expansion is planned for the water supply and pollution control plants and for major feeder mains. There are no infrastructure impediments to development in South Peel. Sewage from east Brampton and Caledon requires pumping to the Etobicoke Creek Trunk Sewer. The South Peel water service should be extended to serve the community of Bolton. Sanitary sewage arising from growth in the Malton area logically should be directed to the Metropolitan Toronto system because it is in the Humber drainage basin. This is another example of inter-regional cooperation with respect to infrastructure development.

Region of Durham

The required works in the Region of Durham for the near term (5-10 years) include the proposed expansions of water supply and water pollution control plants and construction of associated trunk mains and reservoirs. Of particular importance is the proposed new Ajax Water Supply Plant for additional water supply capacity, which capacity is essential for the growth of Durham's dominant major urban centres in the Pickering/Ajax and Whitby/Oshawa/Courtice areas, including the proposed community of Seaton and the proposed airport.

The servicing concept for the longer term requires further expansion of the existing plants and construction of new water supply and water pollution control plants on the lakeshore of the Whitby/Oshawa/Courtice area, due to the lack of site capacity at the existing plants. A planning study has been initiated to examine the long term servicing options including integration of water systems for Whitby/Oshawa/Courtice and Bowmanville, and utilization of the York/Durham sewage system.

Metropolitan Toronto

The perceived water supply problems and needs in Metropolitan Toronto include:

- aging infrastructure needs to be maintained or upgraded to meet new requirements;

- production and distribution system to serve both Metropolitan Toronto and the Region of York is reaching capacity;

- emphasis is being placed on water quality improvements.

In terms of sewerage/water pollution control problems and needs, the major issues include:

- aging infrastructure needs to be maintained;

- sewer systems and plants are reaching capacities;

- stricter operating guidelines are being enforced.

The preferred approach in Metropolitan Toronto centres on a pro-active water conservation program and basic expansion and upgrading of the water and sewer system. The R. L. Clark and F. J. Horgan water plants have been designed to facilitate expansion. Sewage treatment plant expansion will be required at the Highland Creek, Humber and Main plants, and the North Toronto Sewage Treatment Plant will require rehabilitation. Initiatives are also being taken with respect to removing combined sewer overflows. Major improvements will be required in the Don Trunk sewer system. The Keele Street Trunk Relief Sewer will be required to provide for environmental improvements and new development in the Black Creek basin.

Region of York

There are constraints on the amount of new development which can occur in the northern part of York Region. Finite limits to sustainable ground water supplies servicing Aurora, Newmarket and East Gwillimbury require investigation of alternative supplies. Ultimately, the serviceable population for Lake Simcoe based communities will be limited by sewage treatment capability, in particular the limits on phosphorus. The affected communities are Keswick, Sutton, Schomberg and Mount Albert. Limited assimilative capacity in receiving watercourses establishes growth ceilings for the communities of Kleinburg, Holland Landing and Stouffville. Restrictions on further rural subdivision developments (dependent on private servicing) will preclude any significant growth in communities without sewage treatment capabilities.

In the southern part of York Region, there is a need for commitment to a long term water strategy to recognize the full potential of communities (particularly within the York/Durham sewage system service area). New sewage system capacity may be realized either by a possible extension of the Keele trunk relief sewer (including expansion of the Metro Toronto Humber plant or connection to the South Peel System) or through adjustments to the operation of the York/Durham sewage system and through expansion of that system. As noted above, nodal development in the vicinity of Highway 400 and Highway 7 in the City of Vaughan is constrained in the immediate future by the lack of sewer capacity, and expansion of the system will be required either through upgrading of the York/Durham sewage system, or by the extension of the Keele Street trunk relief sewer, or by possible connections to the South Peel sewage system.

4. COST IMPLICATIONS

It was possible in the time available to produce only broad estimates of the capital budgets required to achieve the proposed system expansion and improvement priorities. These are summarized below:

Short Term System Expansion

As shown more fully in Exhibit 2.11 (Section 2.6.3) the estimated capital costs for short term system expansion elements are as follows (expressed in billions of 1991$):

Rapid Transit	$ 5.8
Commuter Rail	$ 0.8
Highways and Regional Roads	$ 4.6
Short Term Expansion Totals	$11.2

Longer Term System Expansion

Estimated capital costs for projects initiated beyond the coming 10 years are broadly as follows:

Rapid Transit	$13.6
Commuter Rail	$ 3.4
Highways and Regional Roads	$ 6.4
Longer Term Expansion Totals	$23.4

The total capital budget for transportation system expansion is therefore estimated to be some $34.6 billion. As noted in the ***GTA Urban Structure Concepts Study*** the overall capital cost of transportation and water/sewer systems is relatively insensitive to the urban structure (e.g. **Nodal** versus **Spread** or **Central**). However, the allocation of costs among various transportation modes and the resulting quality of urban form and functions will benefit from the Nodal concept and related infrastructure policies. Operating costs, environmental quality and resource conservation will also be major benefits.

It is more difficult to estimate the additional costs of system optimization (transportation management) measures. Some of these, such as HOV/transit priority lanes and related transit priority measures, are included in the system expansion estimates in terms of such measures on provincial highways linking the suburban nodes, but implementing an HOV network within Metro Toronto and other urbanized parts of the GTA would require additional capital investment (some of which is in current capital budgets). Similarly, other transportation management measures such as transit communications/control and freeway traffic management systems, retrofitting to reduce on-street parking/loading, intersection improvements and, in the longer term, introduction of electronic road pricing, will require additional funding. It was not possible in the time available to address more fully the capital budget implications of such measures, but it is likely that they would be in the order of magnitude of $1-2 billion, substantially less than the required system expansion budgets. It is for this reason, and because of their more immediate benefits in terms of increased capacity and related community, environmental and economic benefits, that the various transportation management measures are emphasized by the Working Group as being of the highest priority.

4.2 WATER/SEWER SYSTEMS

At present, some $350 million per year is being invested by the regions in trunk water and sewer infrastructure. These expenditures are aimed at expanding capacities through to the turn of the century and beyond, and in meeting evolving environmental standards.

During the ***GTA Urban Structure Concepts Study,*** broad capital cost estimates were prepared for expanding the trunk water and sanitary sewerage systems to the year 2021 to serve a GTA population of 6 million people and total GTA employment of 3.4 million jobs. The cost estimates to expand the trunk water and sanitary sewerage systems for the Nodal concept totalled $3.5 billion to provide the required 2021 capacities.

In addition to these cost estimates for the trunk systems, the local land development costs including the grading of development areas, installation of local water and sewer services, storm water management, and installation of local electric power service, street lighting, streets and sidewalks amounted to $11 billion.

It should be noted that the Nodal development concept involved substantially reduced land development costs in comparison to the spread development concept (which would reflect existing trends). It was estimated that this saving in land development costs could amount to $4.7 billion to the year 2021.

5. NEXT STEPS

The next steps in moving to achieve the GTA vision are seen to be as follows:

- **public consultation leading to consensus on the vision and associated infrastructure requirements;**

- **establishment of a provincial/municipal mechanism to determine infrastructure and development priorities in the GTA context;**

- **streamlining of the Environmental Assessment and planning approvals process, for example by integrating the planning and Environmental Assessment process;**

- **more detailed planning/analysis/design and implementation of the higher priority elements;**

- **development and application of infrastructure financing mechanisms such as public/private funding partnerships and capital financing based on dedicated user revenue streams.**

The latter point is particularly important **to provide the financial capability necessary for achieving the extensive infrastructure improvements described in this report and for ongoing maintenance and rehabilitation of the infrastructure systems.**

* * *

The findings and proposals summarized above and described more fully in Parts 1, 2 and 3 of the report, are respectfully offered by the Infrastructure Working Group as a basis for immediate and sustained action to achieve the GTA vision.

GTA 2021
INFRASTRUCTURE REQUIREMENTS

PART 1: THE CONTEXT

INFRASTRUCTURE WORKING GROUP

MARCH, 1992

1.1 INTRODUCTION

1.1.1 BACKGROUND: EARLIER REPORTS

During 1989, the Office of the GTA (OGTA) and the Greater Toronto Coordinating Committee (GTCC) initiated studies of demographic and economic trends in the GTA which resulted in low, medium and high estimates of population and employment for the Area during the next 30-40 years. Intensive meetings with planning staff of the five regional municipalities and 30 area municipalities comprising the Greater Toronto Area (GTA) resulted in a "most likely trends" allocation of this growth among the 35 municipalities if current development trends were to persist.

During the spring of 1990, the GTCC commissioned a consortium of consulting firms led by IBI Group to conduct the ***Greater Toronto Area Urban Structure Concepts Study*** to investigate the infrastructure requirements, capital costs and quality of life implications of three generic urban structure concepts for the Greater Toronto Area, designated as **Spread** (trends), **Central** and **Nodal**, respectively. In parallel, Ron Kanter, MPP was asked by the Province to prepare a greenlands strategy for the Greater Toronto Area. The ***Urban Structure*** and ***Greenlands Strategy*** reports were both published during the summer of 1990, as was ***Watershed,*** the second interim report of the Royal Commission on the Future of the Toronto Waterfront.

The three reports dealt with various aspects of future development in the Greater Toronto Area, with the common theme of providing a clearer understanding of the environmental, economic and social implications of alternative development policies for the Area. ***Watershed*** emphasized the need for and implications of an **ecosystem approach** to urban and regional planning involving "broad, integrated, regional thinking" which would "cut across both traditional boundaries and established jurisdictions". The Kanter study defined, identified and classified 975 areas and features of regional significance and recommended a **greenlands strategy**, including institutional arrangements to link and protect these areas. The ***Urban Structure Concepts Study*** revealed that, while the capital costs for infrastructure were similar among the three urban structure concepts studied, their likely impacts on the environment, the economy and the community would be quite different:

- the **Spread** concept, while it would require the least change in our institutions for planning and delivering urban development/ infrastructure, would also be least sustainable in that it would consume the most greenfields land and energy and would have the greatest negative impacts on environmental quality, for example by producing substantially greater volumes of automotive atmospheric pollutants;

- the **Central** concept would make the most efficient use of resources such as land and energy and would place the least negative load on the environment, but would require the greatest amount of government regulation in order to divert population growth from suburban areas to central, built up areas;

- the **Nodal** concept would build on existing communities and their urban infrastructure, providing for continuing population and employment growth both in the suburban and in the central built up areas, but stressing

compact, mixed-use communities which would favour the use of urban transit, walking and cycling for many trips. This concept would also provide the greatest range of choice in terms of population density and housing types, community size and character, suburban and downtown living styles, transportation modes, and integrated delivery of human services, while reducing per capita resource requirements and pollution levels relative to the **Spread** concept.

During the fall of 1991, the Provincial government released ***Growing Together: Towards an Urban Consensus in the Greater Toronto Area*** which summarized the results of a consultative process on the ***Greater Toronto Urban Structure Concepts Study*** and summarized relevant findings of ***Watershed*** and the ***Greenlands Strategy*** report. Comments by the municipalities, provincial ministries and other groups regarding the three options described in the ***Urban Structure Concepts Study,*** as summarized in ***Growing Together,*** clearly favoured some type of Nodal structure as the basis for future GTA development.

The report also summarized the results of subsequent work with important implications regarding transportation infrastructure, stating these findings as follows:

> "... the Ministry of Transportation, assisted by IBI Group, undertook a more detailed analysis of road capacity requirements for each of the urban structure concepts. The Ministry concluded that, due to physical and other constraints, road capacity could not be increased sufficiently to avoid a lowering of levels of service, compared to 1986 levels. This was true, in varying degrees, for all three urban structure concepts. This result underlies the importance of land use planning in reducing commuting and in supporting public transit. It also implies a much more ambitious program of transit improvement than might have originally been thought necessary."

1.1.2 TOWARDS A GTA VISION

In March, 1992, the Province released a working document entitled ***GTA 2021 - The Challenge of our Future*** which establishes directions for the future. This document:

- emphasizes the importance of social equity, enhanced employment and economic vitality, and a healthy environment as shared values which must underlie future planning and development decisions;
- identifies the challenges of achieving an emerging consensus regarding growth management, and establishes the need for a new, integrated strategy;
- describes a vision for the GTA in 2021 in terms of diverse, supportive and participative communities, stewardship of the environment, a prosperous society, and a Nodal urban structure; and
- sets an agenda for consensus and actions.

As part of the latter initiatives, six working groups of provincial and municipal staff were established during the fall of 1991 to "... give advice on the attainability of our vision and outline

the next steps that must be taken in certain areas." The titles and subject areas of the six working groups are as follows:

1. Urban Form;
2. Countryside;
3. Human Services;
4. Economic Vitality;
5. Infrastructure;
6. Investment Planning and Mechanisms.

The groups were charged with providing for future actions, proposing immediate steps where applicable, showing how decisions can be reached and specifying further needs for information and consultation. The work of these groups is to be published and circulated to provide the background for the informed public debate that will occur in the spring of 1992 before a final strategic action plan is drafted.

1.1.3 OBJECTIVES OF THIS REPORT

This is the report of the Infrastructure Working Group, responding to the above mandate. The Working Group's terms of reference, as documented in ***GTA 2021 - Meeting the Challenges*** state the following:

> "Improved and expanded infrastructure systems are needed to support the Province's Vision for the GTA."
>
> "This group will prepare an inventory of existing and planned infrastructure. Based on the preliminary set of nodes prepared by the Urban Form Working Group and on the inventory of environmental features prepared by the Countryside Working Group, advice will be provided on the best way to use existing and planned infrastructure and on the need for additional investment over the next 30 years."

The Group's terms of reference charges it with focussing on transportation and sewer and water systems as the basic "linear" infrastructure provided by the public sector and providing the "skeleton" on which urban development is based. The Group was asked to assess ways of using the existing transportation and water/sewer systems most efficiently and effectively and to identify system expansion - planned ahead of new urban development and implemented in tandem with it - which will be required to serve and help shape the GTA Vision.

More specifically, the following tasks were to be addressed by the Infrastructure Working Group:

1. Inventory existing infrastructure and commitments and examine ways to make best use of the existing systems.

2. Determine appropriate infrastructure necessary to implement the Vision and broad priorities in its delivery.

3. Identify the necesary corridors, rights of way and land sites to be protected for future expansion of transportation and water/sewer systems.

The Group also undertook to comment more broadly on other urban infrastructure requirements, including energy utilities (e.g. electricity, natural gas), solid waste management, stormwater management, and major human services facilities (e.g. hospitals and schools).

1.1.4 STRUCTURE OF THE REPORT

Reflecting the above requirements, this report is presented in three parts:

Part 1: The Context: following the Introduction, Section 1.2 describes and discusses GTA objectives and policy issues, factors affecting demand for and utilization of transportation and water/sewer systems and major trends, problems and opportunities underlying future requirements. The third section outlines the GTA Vision to be supported and served by the infrastructure systems, including the Nodal development concept as formulated by the Urban Form Working Group and comments on infrastructure and related considerations bearing in mind interactions with the mandates of the other working groups.

Part 2: Transportation: the six sections in this part of the report deal respectively with existing deficiencies, major facilities and planned expansion, transportation principles and major issues, needs and improvement options, and proposed transportation policies and priority actions.

Part 3: Water and Sewer Systems: this part of the report parallels Part 2; its four sections deal respectively with existing major systems and planned expansion, servicing constraints and principles, needs and improvement options, and proposed water/sewer policies and priority actions.

The overall approach, findings and recommendations of the Infrastructure Working Group are summarized in the Overview: Strategic Directions section at the beginning of the report.

1.2 OBJECTIVES AND POLICY ISSUES

1.2.1 GTA POLICY OBJECTIVES

The Healthy Community Model developed by Dr. Trevor Hancock of York University stresses the importance of a balanced and interactive approach to achieving **environmental**, **community** and **economic** goals. The basic system of values and objectives discussed in ***GTA 2021*** are grouped below under these three headings and discussed briefly in terms of their infrastructure implications:

Community

The basic objective is to accommodate substantial population and employment growth in the GTA on a sustainable basis which achieves community, environmental and economic goals in a balanced manner. In quantitative terms, the existing (1990) population of about 4.0 million persons and employment of about 2.2 million jobs is expected to grow by 2021 to about 6.0 million persons and 3.4 million jobs. The future transportation system must be capable of serving this 50% increase efficiently and effectively while helping to shape the desired Nodal urban structure. Similarly, the water and sewer systems must be located, sized and managed to help shape urban development and provide the necessary water and sewer capacity. Providing expanded transportation capacity as the metropolitan area grows will require increasing emphasis on public transit which, in turn,

will require more compact, mixed-use urban structure. The Nodal concept is designed to achieve this while also providing a broad range of choice in terms of housing types, community density, and urban or suburban lifestyles. Compact, mixed-use communities will also help achieve social equity and integrated, efficient delivery of human services. The local transportation system, including sidewalks, streetscapes and surface transit, must be designed to encourage transit use, walking and cycling, which are highly efficient, environmentally-preferred and health-promoting modes of travel.

Environment

As comprehensively described in the ***Greenland Strategy*** and ***Watershed*** reports, it is essential that a comprehensive and integrated system of green open spaces, links and parks be established and maintained throughout the GTA. The existing major green areas - including rivers, conservation areas, the Niagara Escarpment and the Oak Ridges Moraine - are illustrated in Exhibit 1.3. To the maximum extent possible, infrastructure systems should avoid these areas or be designed in such a manner as not to degrade their environmental quality, habitat suitability and recreational diversity.

The quality of air, water and soil must be maintained and, if possible, enhanced. In infrastructure terms this means that the annual volume of automotive pollutants emitted into the atmosphere should be stabilized and, if possible, reduced; sceptic tank systems and combined sewer systems should be modified and stormwater management systems improved to reduce contamination of groundwater and runoff into the Area's rivers and lakes; and existing soil contamination should be cleaned up at existing and former transportation/industrial sites, and further contamination prevented.

Conservation of greenfields land and energy is also an essential objective if the GTA is to be sustainable over the long term. In terms of transportation, this means achieving compact, mixed-use development to encourage shorter trips, more walking/cycling and greater use of transit and utilization of more energy-efficient automotive and transit technologies, along with management and pricing strategies to encourage more efficient use of the passenger and freight movement systems. Similarly, cost-based pricing of water, coupled with water meters for all consumers, will encourage conservation of this precious resource and moderate the required expansion of water/sewer systems to serve increased population and employment.

Greater use of renewable resources (such as solar energy and muscle power) rather than non-renewable resources (such as coal, oil and other fossil fuels) will help achieve energy conservation. Other resources, such as land, top soil, water and forests, which are renewable if used on a sustained yield basis, must be so utilized to avoid degrading them more quickly than they can replenish themselves.

Economy

The competitiveness of the GTA economy in a changing world economy must be maintained and enhanced to provide for continuing growth of high-quality job opportunities and generate the financial resources to achieve desired community and environmental objectives. In transportation terms, this means providing sufficient capacity and a high level of service for both passenger and freight movements throughout the GTA and linking the GTA to other regions and centres. Transportation costs must be reasonable in terms of the delivered cost of goods and daily transportation costs experienced for personal travel. Transportation services must be safe,

efficient and reliable. Similarly, water and sewer systems must be capable of supporting economic activities of all types throughout the GTA as appropriate to the desired development concept, at prices which are competitive with such services in other centres yet sufficient to support the real cost of providing these services. Revenue streams from users of both the transportation and water/sewer systems should be dedicated on a sustainable basis to finance ongoing maintenance, rehabilitation and expansion of the systems.

Quality of Life

There are many factors which contribute to the quality of life. Among the more basic are sufficient food, shelter and clothing, clean water and air, sufficient space in which to live, work and play and a lack of stress-inducing factors such as violence, noise, long working hours or commuting time or other forms of pressure. Many of these and other important factors affecting the quality of life are, in turn, directly related to available resources (e.g. open space, trees, wildlife, agricultural productivity), the quality of the environment (e.g. clean water and air, good top soil which is not polluted by chemical waste), and the health of the economy (the quality and diversity of employment opportunities, efficiency of basic infrastructure, and human services to support a trained and healthy population.

A high quality of life requires balanced achievement of the community, environmental and economic objectives outlined above and, as noted, urban infrastructure will play a major role in achieving these objectives and allowing "quiet enjoyment" of the natural and built environment by the GTA's residents and visitors.

1.2.2 UNDERLYING FACTORS AFFECTING INFRASTRUCTURE DEMAND

There are a number of factors which affect the demand for transportation, water/sewer and other urban infrastructure. Most basic are growth in population and employment, changes in the demographic profile of the population, changes in income and related economic/social opportunities, technological developments, and government policies and standards such as those affecting the environment. Exhibit 1.1 illustrates some of these variables for the GTA over the 25 year period from 1961-1986. As shown, while the growth in GTA population has been very substantial (77%), employment has grown even more (142%) and the growth in daily trips has been larger (157%). The number of daily trips per capita has increased by 1.5% per annum or 47% over the 25 year period, reflecting a number of demographic, economic and transportation trends which are summarized at the bottom of the exhibit. Factors such as massive population growth in suburban areas and diverse work trips from multi-worker households have led to longer average commuting distances. More trips per capita, longer trips on average and greatly increased car ownership levels have created enormous pressure on the region's roads and transit facilities. The considerable road and rapid transit capacity added to the GTA in the 1950s and 1960s has become increasingly congested during the 1970s and 1980s and system expansion has not kept up with the explosive growth in demand during the last two decades. This reflects a massive relocation of provincial and federal budgets during the past 25 years from physical infrastructure (e.g. transportation, water/sewer systems) to human services (e.g. education, health, social support).

As also shown in Exhibit 1.1., sanitary sewage production grew by 84% and solid waste generated grew by 159% during the 25 year period, reflecting a combination of population and employment growth, increased real incomes and greater reliance on a "throw-away" society and economy.

EXHIBIT 1.1: GTA[1] GROWTH: 1961-1986

	1961	1986	1961-1986 % INCREASE
• POPULATION	2,106,000	3,733,000	77%
• EMPLOYMENT	846,000	2,049,000	142%
• DAILY TRIPS	2,948,000	7,577,000	157%
• DAILY TRIPS PER CAPITA	1.40	2.03	45%
• AVERAGE WORK TRIP LENGTH	11.4 km	15.1 km	33%
• CAR OWNERSHIP PER CAPITA	0.30	0.52	73%
• SANITARY SEWAGE (M Gal./Day)	239	441	84%
• SOLID WASTE (M/Tonnes/Year)	1.58	4.10	159%

REASONS FOR MORE TRIPS PER PERSON

- MORE ADULTS PER HOUSEHOLD
- MORE WOMEN IN THE WORK FORCE
- HIGHER REAL INCOMES AND CAR OWNERSHIP
- GOODS MOVEMENT SHIFT FROM RAIL TO TRUCK

REASONS FOR LONGER TRIPS

- GREATER SCALE OF GTA
- RAPID HOUSEHOLD FORMATION
- HIGH LAND COSTS AND MORE SUBURBAN HOUSING
- MORE HOUSEHOLDS WITH 2+ WORKERS
- SHORTAGE OF RENTAL ACCOMMODATION

1: COMPRISES METRO TORONTO AND THE REGIONS OF DURHAM, HALTON, PEEL AND YORK. TRANSPORTATION DATA ARE DRAWN FROM STATISTICS CANADA, THE 1964 MTARTS SURVEY AND THE 1986 TRANSPORTATION TOMORROW SURVEY

Source: Inter-Regional Transportation Planning, by N.A. Irwin, 1989

Technological changes have also affected the supply and demand of basic urban infrastructure. Smaller, more efficient and (in relative terms) less expensive automobiles have contributed to the dramatic increase in car ownership. The advent of "the pill" in the mid 1960s underlay the sudden drop in fertility levels that brought the baby boom to a close and led, in turn, to rapid increases in the number of women in the labour force and families with two breadwinners, no children, several cars, and greatly increased per capita trip making. The mass adoption of personal computers, word processors, fax machines and related office equipment developments has made it possible for a variety of professional and office services to be provided from the home of the employee. This was expected to have a significant effect on commuting trips and it was therefore felt by some that there would be a corresponding levelling of peak period work day travel demands. While there has been some broadening of the automotive travel peak, peaking of total person trips to the central area of Toronto has actually increased over the past 15 years, with the very substantial increase in trips to that destination area being carried entirely by expansion of the GO Transit system. It is therefore difficult to isolate the impact of "cottage industry" employees working at home on travel patterns, but significant future impacts are still possible.

Technological developments are also affecting the provision and use of water/sewer systems. Perhaps the most significant of such development is the mass availability and marketing of water saving shower heads, faucets and toilet reservoirs which, coupled with cost-based pricing of water, can be expected to affect per capita consumption levels noticeably. Another pervasive underlying factor is the greatly increased public sensitivity to environmental issues which developed during the 1980s. This has led, on the positive side, to more careful consideration of the environmental implications of urban land use and infrastructure developments; on the negative side it has created an expensive and time consuming process of Environmental Assessment which has delayed the timely provision of major infrastructure elements with resulting reductions in economic efficiency, land use support and mobility. Such delays, particularly as they apply to environmentally-friendly modes such as transit, are a matter of continuing concern.

1.2.3 FACTORS AFFECTING INFRASTRUCTURE EFFICIENCY AND EFFECTIVENESS

Factors affecting the cost-effectiveness of urban transportation can be grouped under three major headings:

1. Land Use;
2. Networks;
3. Management.

As discussed earlier and illustrated quantitatively in the ***Urban Structure Concepts Study,*** more compact and mixed **land uses** can have a very substantial impact by increasing the extent to which walking and cycling can be substituted for vehicular trips, reducing the average trip distance/duration, increasing the number of destination opportunities which can be reached per unit travel time, and increasing the extent to which public transit can replace private auto travel for discretionary trips, particularly commuting trips.

The nature and extent of road and rail **networks** will also have a profound impact on the above aspects of travel behaviour and also on the extent to which goods movement will be accomplished efficiently with minimum interference from or to personal travel movement. The location, coverage, continuity and function of road and rail networks are all major factors affecting mobility and travel behaviour. For example, the wide spacing of arterial roads and lack of through routes on collector and local streets in many new suburban areas (often coupled with very low

development density) has made it very difficult to provide convenient, cost-effective transit services to, from and within such areas. On a more positive note, the provision of increased commuter rail services on seven radial lines in the GTA by GO Transit has resulted in a 259% increase in GO Transit ridership to the Central Area of Toronto during the past 15 years and provides a continuing opportunity to increase the capacity, coverage and service level of express commuter rail services throughout the GTA in the future.

The importance of **transportation management** as a determinant of travel behaviour has also been well established. The level of service (average speed, safety, reliability, convenience/comfort, etc.) provided by road and rail facilities and by private and public transportation are particularly important in affecting the balance of use between roads and transit. Similarly, the price paid for such services, and control/information systems affecting the users' ability to use the system efficiently, have a significant impact on both modal choice and the effective capacity of various transportation facilities.

Similar interactions affect the efficiency and effectiveness of water and sanitary sewer systems. The **networks** of trunk water and sewer pipes and the location and capacity of treatment plants have a direct effect on the timing, location and density of **land uses** and can be used by government as a major determinant of urban form. In turn, the form, density and mix of land uses resulting from the planning, zoning and approvals process will directly affect the usage levels of trunk servicing facilities.

Management of water and sanitary sewer systems is also a major determinant of their utilization. As noted earlier, cost-based pricing for water and separation of sanitary and storm sewers can have a significant impact on per capita water consumption/sewer effluent levels and the ability of the system to avoid groundwater and river/lake contamination during major storm events.

These factors were considered by the Working Group as it assessed ways of using existing infrastructure more efficiently and, beyond that, requirements for expanding the transportation and water/sewer systems to support the Nodal development concept for the GTA.

1.2.4 MAJOR TRENDS, PROBLEMS AND OPPORTUNITIES

The trends described earlier for the 25 year period from 1961 to 1986 are expected to continue, but with some changes reflecting demographic and other factors. As illustrated in Exhibit 1.2, during the 25 years from 1986 to 2011 the population is expected to increase by some 46%, employment by about 59% and daily trips by about 49%. This is a substantially lower rate of growth than that experienced prior to 1986, reflecting the aging of the baby boom generation, saturation of the rate of entry of woman into the out-of-home labour force, a slower rate of household formation and other factors as indicated on the exhibit. Increases in sanitary sewage (57%) and solid waste production (57-147%) are also expected to be considerably lower those experienced in the previous 25 years, reflecting similar factors and the effects of relevant environmental policies.

Nevertheless, the absolute increase in transportation demand, water consumption and sewage and solid waste production from an additional 2 million people and 1.2 million jobs between 1990 and 2021 will require significant optimization and expansion of existing infrastructure systems.

Perhaps the major challenges in this regard are, on the one hand, the difficulty of providing coordinated planning and delivery of land use and infrastructure in an urban area comprising 35

EXHIBIT 1.2: ANTICIPATED GTA[1] DEMOGRAPHIC AND INFRASTRUCTURE DEMAND TRENDS

	1986	2011	1986-2011 % INCREASE
• POPULATION	3,733,000	5,438,000	46%
• EMPLOYMENT	2,049,000	3,259,000	59%
• DAILY TRIPS	7,577,000	11,311,000	49%
• TRIPS PER CAPITA	2.03	2.08	2%
• AVERAGE WORK TRIP LENGTH	15.1 km	16.2 km	7%
• CAR OWNERSHIP PER CAPITA	0.52	0.55	6%
• SANITARY SEWAGE	441	634	57%
• SOLID WASTE	4.10	6.45-8.80	57-147%

TREND INDICATORS

- SMALL, MORE ADULT HOUSEHOLDS
- HIGH INCOMES/CAR OWNERSHIP
- SATURATION OF FEMALE LABOUR FORCE LEVELS
- SLOWER RATE OF HOUSEHOLD FORMATION
- SATURATION OF RAIL-TRUCK GOODS MOVEMENT SHIFT

1: COMPRISES METRO, DURHAM, YORK, PEEL, HALTON

Source: Based on Inter-Regional Transportation Planning, by N.A. Irwin, 1989 and GTA Urban Structure Concepts Study, by IBI Group for the GTCC, 1990

municipal governments and a provincial government with at least 11 relevant ministries and, on the other hand, the lack of financial capability available for public sector funding of new infrastructure. Offsetting these potential problems are corresponding opportunities: the joint provincial/municipal initiatives currently underway hold the promise of coordinated planning/delivery of infrastructure and other policies to achieve the desired Nodal development concept for the GTA with all of the benefits expected to flow from this: infrastructure efficiency from more compact/mixed land use and greater optimization of infrastructure use, coupled with innovative financial partnerships with the private sector, are expected to increase greatly the effectiveness of each public dollar spent.

1.3 THE GTA VISION

1.3.1 GREENLANDS, INFRASTRUCTURE AND RELATED CONSIDERATIONS

As shown in Exhibit 1.3, the greenlands concept for the GTA illustrates major green areas and links which should, to the extent feasible, be retained as such in order to provide a future heritage of open space for coming generations. There are, of course, a number of existing communities located within the green areas shown (e.g. the Oak Ridges Moraine) and some of these are logical locations for development nodes, building on the existing community and infrastructure. To the extent possible, however, the green areas should be kept clear of major urban development and, in particular, of urban sprawl in order to avoid irreversible loss of farmland and related public open space and environmental degradation in headwater and downstream areas.

A second major input in developing a Nodal land use concept is the location of existing and designated urban development areas (shown in Exhibit 1.4 based on current official plans) and the location and nature of major transportation and water/sewer facilities already in place. The GO Rail system/stations and rapid transit lines provide obvious spines for efficient transportation among Nodal communities. Major highways provide a similar connective function, particularly those on which priority and/or express bus services can be provided as well as major truck routes linking nodes with higher proportions of industrial employment.

Similarly, the location of existing trunk sewage and water facilities provides a logical starting point for the designation and expansion of nodes to take advantage of existing servicing capacity and the ability to expand this cost-effectively.

1.3.2 THE NODAL DEVELOPMENT CONCEPT

Building on the Nodal concept analyzed in the ***Urban Structure Concepts Study*** and consideration of factors such as those outlined above, the Urban Form Working Group defined a proposed Nodal development concept and related corridors of compact, mixed use development, as illustrated in Exhibit 1.5. As shown, this comprises five major nodes, downtown Toronto and 23 intermediate nodes. It was assumed that each major node could have an anticipated population increase in the 100,000-250,000 range over the coming 30-40 years, and each intermediate node would have an additional population of 30,000-100,000 people over the next 30-40 years, in addition to the Downtown node which could experience an increase of 100,000-250,000 people over the same period. On average, employment increases in the various nodes would be 50-60% of the population increases, reflecting the overall growth of employment relative to population in the GTA. In practice, it would be expected that there would be a proportionally higher increase in employment for nodes which are currently mainly residential in nature and a proportionally lower increase in employment for nodes which currently have a relatively high proportion of

THE GREENLANDS CONCEPT

EXHIBIT 1.3

EXISTING URBAN ENVELOPES

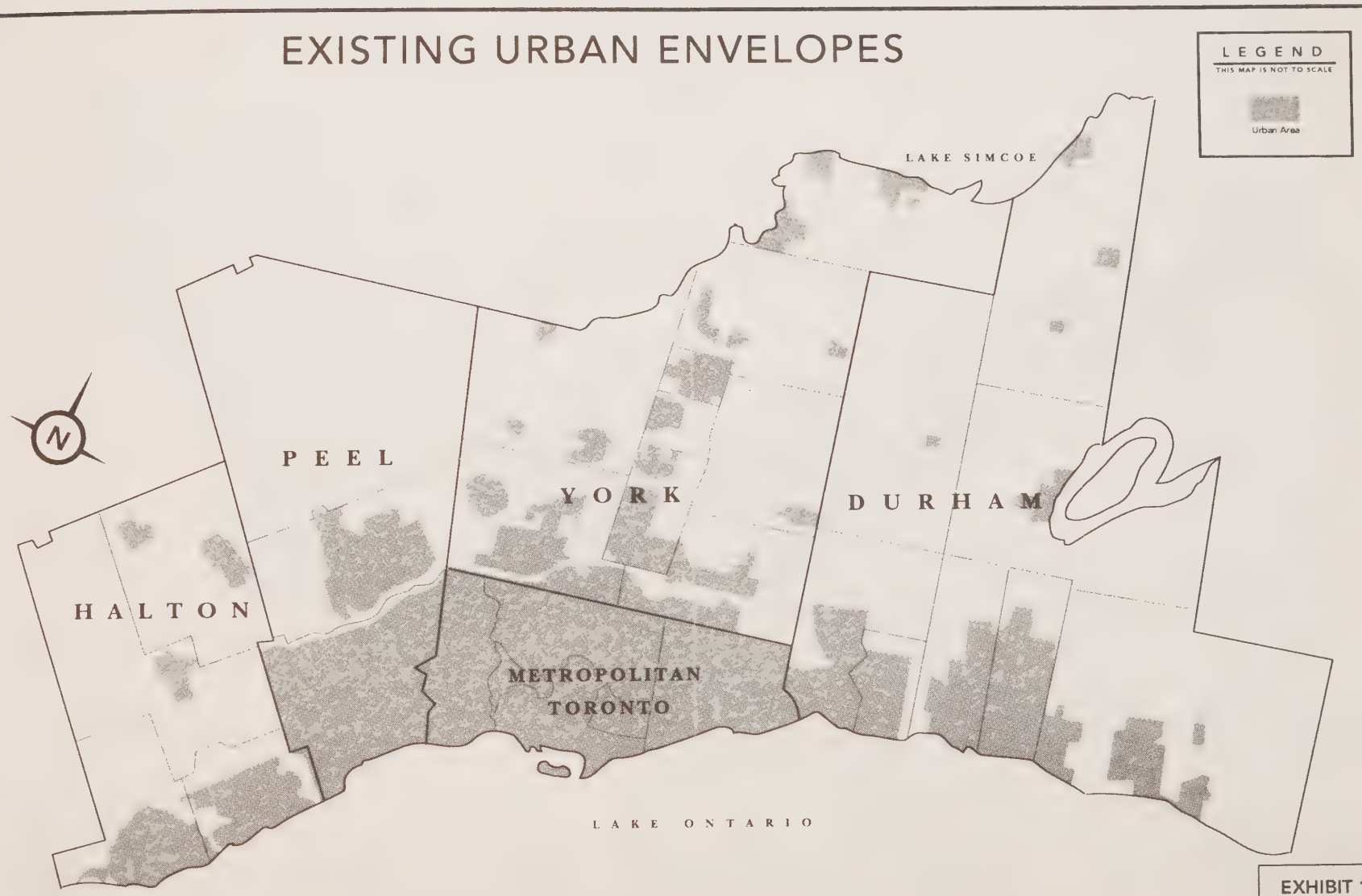


EXHIBIT 1.4

THE NODAL LAND USE CONCEPT

EXHIBIT 1.5

employment, in order to achieve a more uniform balance of jobs and residential population in the various nodes. The Toronto downtown core and the major nodes would continue to have a higher proportion of employment relative to population, as is currently the case, reflecting their roles as regional centres and sub-centres, but significant population growth would also be sought in such nodes.

It is understood that the Nodal development concept will also include a larger number of intermediate nodes but the locations of these were not provided by the Urban Form Working Group. As noted in the Overview section, pages S.2 and following, the Urban Form working Group originally provided a concept with ten major nodes plus downtown Toronto and the Infrastructure Working Group concentrated therefore on the eleven nodes which were specified at the time this report was being prepared. The Infrastructure Working Group recognized, of course, that continuing growth will also occur elsewhere in and adjacent to existing urbanized parts of the GTA. Priorities for the intermediate nodes, as well as the major nodes, should reflect the availability of existing infrastructure capacity and the ability to expand infrastructure capacity cost-effectively.

In the time available to the working groups, the Urban Form Working Group was unable to provide more specific definition of the Nodal concept and it was impossible for the Infrastructure Working Group to conduct travel demand analyses in relation to the concept, given the lack of definition and of time for such analyses. Nevertheless, the Nodal concept as illustrated in Exhibit 1.5 provides a spacial and qualitative basis for assessing future infrastructure requirements to serve and help shape the concept.

1.3.3 OTHER INFRASTRUCTURE

While transportation and water/sewer systems have a major impact on urban structure and land use development patterns, the other infrastructure (referred to briefly in Section 1.1.3), tends to have a less fundamental impact. This is because energy utilities, systems for managing solid waste and stormwater, and major human services facilities are generally built as required to serve development, concurrently with the initial development, and are expanded as needed thereafter. It is for this reason that the current report focusses on basic transportation and water/sewer systems, which have a fundamental impact on the viability and location of urban development, generally lead such development, and are provided by the public sector.

During the course of its work, the Working Group was in contact with Ontario Hydro and Consumers Gas, both of whom confirmed that, in cooperation with affiliated utilities and companies, they would be capable of system expansion to serve the additional population and employment anticipated to 2031 and beyond, and could accommodate various urban development patterns. Maps showing anticipated system expansion plans, in conceptual form, were provided and the Working Group concluded that energy distribution facilities within the GTA would be unlikely to limit anticipated development over the next 30-40 years and can be provided in a manner which would not be unduly disruptive to the urban environment.

Subject to the very challenging problems of locating, designing and managing solid waste landfill sites, similar considerations apply regarding solid waste facilities and systems. The ***Urban Structure Concepts Study (Background Report No. 4: Water, Sewers and Solid Waste)*** demonstrated that various urban structure concepts would have little or no impact on the efficiency and effectiveness of solid waste management systems and the latter would, in turn, have little impact in shaping urban development patterns. The challenges in this field relate more to institutional factors: effective

incentives and arrangements to reduce the amount of solid waste produced and to recycle and reuse such materials. It is anticipated that the Environmental Assessment studies currently underway will provide the basis for decisions on the locations of new waste landfill sites to serve the GTA.

While not a major determinant of urban development patterns, stormwater management systems are affected by the resulting development patterns. As described more fully in the ***Urban Structure Concepts Study (Background Report No. 5: Greening/Environment)*** current provincial policies require newly urbanized lands to retain 125 cubic metres per hectare of first flush stormwater from new subdivisions so that major impurities can settle out and/or be removed by sanitary sewage treatment plants in off-peak periods. The Nodal concept as studied in that report would involve by 2021 the development of 114,400 acres of new residential land, 32,200 acres of new industrial land and redevelopment of some 4,750 acres. The concept would therefore provide significant opportunities to retrofit existing urban areas for retention of first flush stormwater, while complying with the provincial regulations regarding the development of new land. While it is a major element in any program to improve environmental quality in and around the GTA, stormwater management is not viewed as a major determinant of urban development patterns, and the Nodal concept is seen as quite compatible with policies to retain initial runoff and improve the quality of stormwater.

Major human services facilities such as schools and hospitals, as discussed in the ***Urban Structure Concepts Study (Background Report No. 6: Human Services)*** are also relatively uninfluential in terms of their impact on urban development patterns. The efficiency with which existing schools and hospitals can be used is affected, however, by changing population distribution patterns, and it was pointed out that greater emphasis on redevelopment to increase population levels in built-up areas may reduce capital costs by allowing more efficient use of existing buildings in such areas. It was also pointed out that the efficiency and effectiveness of providing human services can be significantly increased in the Nodal concept (relative to the Spread concept) by providing combined facilities in each node such that a range of human services are provided/received at one or two central locations serving the node. Since each node will have a high level of local transit services as well as internodal transit links connecting it to adjacent nodes, both the providers and users of human services would have greater modal choice and convenient access to these services under the Nodal concept.

The above general comments on other infrastructure are intended to highlight the most important interactions between such infrastructure elements and the patterns of urban development and the linear infrastructure systems (e.g. transportation, water/sewer) which are the subject of this report. More detailed consideration of other infrastructure is beyond the scope of the present report; the need for further study in this area is addressed briefly in Section 2.6.4.

To provide an approximate comparison of resource allocation among the various types of infrastructure at the regional level, recent capital budget estimates by the rapidly developing Regions of Peel and Halton indicate that transportation and water/sewer tend to receive on average about 45-55% of the capital budget, schools about 35-40%, hospitals and homes for the aged about 5-10%, and parks and recreation about 2-5%.

GTA 2021
INFRASTRUCTURE REQUIREMENTS

PART 2: TRANSPORTATION

INFRASTRUCTURE WORKING GROUP
TRANSPORTATION SUBCOMMITTEE

MARCH, 1992

2.1 IMPORTANCE OF TRANSPORTATION TO THE GTA

A balanced transportation network comprising roads and public transportation facilities is critical to the economy, the environment and the quality of life in the Greater Toronto Area which is home to 40% of Ontario's residents.

2.1.1 ECONOMY

Transportation plays a significant role in the economic health of the Greater Toronto Area. Transportation corridors have often been referred to as economic corridors based on the significant role they play in economic development. In order to be competitive in domestic and international markets, it is essential that Ontario manufacturing firms have a transportation system that is both cost effective and efficient. This is especially true in the GTA since:

- over 45% of Ontario's jobs (estimated at 4.7 million) are located in the GTA,
- the value of goods movement in the GTA was estimated to be in the order of $6.4 billion in 1986 (Metropolitan Toronto Goods Movement Study),
- 700,000 goods movements are generated each day (Metropolitan Toronto Goods Movement Study),
- 10 - 15% of the traffic flow is commercial vehicles on roads in and around Metro,
- some 200 kilometres of freeways carry more than 10,000 trucks daily, while on Highway 401 within Metro, truck volumes are in excess of 30,000 per day (MTO),
- truck movements, tonnage levels and commodity value, to and from the GTA generally exceed those to Montreal and Vancouver (the next largest Census Metropolitan Areas) combined (Statistics Canada, For-Hire Truck Survey),
- approximately 36% of all intercity truck movements in the Province of Ontario involve a GTA origin or destination (1988 Ontario Commercial Vehicle Survey), and
- Canada's busiest airport, Lester B. Pearson International Airport, handled in excess of 20 million passengers in 1988 and is expected to serve 30 million passengers by the year 2000.

Changing business practices are putting increased importance on the need for an efficient transportation network. The move to just-in-time inventories for both industry and retail sectors requires more frequent and timely delivery of goods. Just-in-time inventories are greatly dependent on the truck transportation industry. The shift of goods movement from rail to truck to meet the demand for quicker, more reliable door-to-door deliveries has, however, added to road congestion. The trucking industry currently handles about 70% of Ontario's exports to the U.S. and about 75% of the province's imports from the U.S. Further adding to the pressure on the road network is the widespread use of couriers and service vehicles.

The trend towards increased movement of goods by road adds to congestion which in turn adds to the price of goods. Transportation costs represent 5 - 13% of the price of manufactured products. Manufacturers, shippers and truckers have consistently stated that the major problem they face in accessing U.S. markets is getting through the congestion in the Greater Toronto Area which greatly affects delivery schedules and costs. The cost of congestion to Metro Toronto businesses was estimated to be $2 billion in 1989. Unless infrastructure investments are made, it has been estimated that by the year 2021 the cost of congestion could amount to $5 billion.

Transportation, in and of itself, contributes to the economy by providing both direct and indirect employment. In Ontario, trucking directly employs approximately 228,000 workers or 5% of the provincial labour force; the goods rail industry employs 17,000; the marine industry 4,000; the airline industry about 25,000; the intercity bus industry 7,000; and the urban transit industry some 16,000. Transit in the GTA is a 1.4 billion dollar a year industry employing 14,000 people.

Money spent on transportation infrastructure is an investment in the economy. Transit capital costs are among the best performers in terms of economic growth. For each million dollars in construction value, 9 person-years of direct employment is created and 70-90 person-years of total (direct and indirect) employment.

Investment in transportation infrastructure will make an important contribution to economic development in the GTA. An efficient and reliable transportation system is imperative for timely and cost effective movement of goods.

2.1.2 ENVIRONMENT

Transportation and land use planning are mutually dependent, each with the ability to positively impact the environment. The transportation network determines the ease of movement from one place to another and in turn, affects the location of activities or the land use pattern. For example, 90% of all high-rise commercial development in Metro is found along the subway. The construction of the subway has not only encouraged the concentration of development at nodes and along corridors but has contributed to the health of the downtown by providing easy access to employment opportunities. The more environmentally friendly public transit system moves people who would otherwise drive.

The location of activities can, on the other hand, influence the type of transportation services which can be provided. For example, concentrated development supports the provision and use of rapid transit. Land use controls and urban design can serve to:

- reduce long distance trips which are energy consumptive through achieving a better balance of jobs and people;
- promote travel modes which improve air quality; and
- provide for green transportation such as cycling and walking.

With good planning and implementation practices, transportation in conjunction with land use planning, can support the environment. Transit provides significant benefits to the environment by lessening overall congestion and by reducing auto usage thereby reducing the emission of greenhouse gases.

2.1.3 COMMUNITY AND QUALITY OF LIFE

Transportation plays a vital role in the community not only in providing a key link between home and work but in providing access to schools; medical facilities; shopping; and social, recreational, cultural and volunteer activities.

The transportation network contributes to quality of life by providing access for all, including disabled and elderly persons. Travel is relatively unconstrained and the widespread provision of transit offers a choice to users.

2.2 EXISTING DEFICIENCIES, MAJOR FACILITIES AND PLANNED EXPANSION

2.2.1 EXISTING DEFICIENCIES

Existing transportation deficiencies in the GTA, as identified by the Working Group, are listed more fully in Appendix A. Highlights are summarized in this section.

The basic components of the GTA transportation systems are the **road network** (particularly the provincial 400-series highways, urban freeways, other provincial highways and major arterial roads), **GO Transit** (in particular the commuter rail service provided on 7 radial lines focussing on Union Station in downtown Toronto, plus inter-regional commuter bus services provided by the same agency), and **municipal transit** (surface bus operations provided by 16 municipal transit properties, plus a network of subway and LRT services provided by the Toronto Transit Commission).

There was very substantial investment in the rapid transit and major roads networks during the 1950s and 1960s when a larger proportion of government funds was available for physical infrastructure than is now the case and an integrated approach was possible for most of the urbanizing area under the Metropolitan Toronto regional government. The pace of new transportation construction, particularly serving built-up areas, tended to slacken during the 1970s and 1980s as provincial spending priorities turned more and more to social, education and health requirements, environmental concerns made approval more difficult to obtain, and development spilled over into an increasing number of municipalities beyond the boundary of Metro Toronto.

The result of these trends is that excess transportation capacity which existed during the 1960s and 1970s was increasingly used up and increasing levels of congestion were experienced during the 1980s and more recently. Some of the worst areas of road congestion are across the Metropolitan Toronto-Mississauga boundary and across the north and east boundaries of Metro Toronto, crossing the Credit River and Cawthra Road screenlines in Mississauga, throughout the Highway 7 corridor in York Region, in the 401 corridor in Durham, Metro and Peel regions, and in the QEW/Highway 403 corridor in south Peel and Halton. Highway 401 is experiencing very substantial peak period congestion throughout its length in the GTA and this is particularly so in the area south of Pearson Airport and the section east of the Metro Toronto boundary.

The increasing levels of road congestion have resulted from a rapid increase in auto ownership during the 1970s and 1980s, coupled with demographic and economic changes as documented earlier in Section 1.2.2. Substantial increases in peak period auto commuting trips were matched by parallel increases in truck trips as an increasing proportion of freight movement were attracted from rail to the highway mode. While the desire for quicker door-to-door delivery motivated much of this shift, increasing road congestion is contributing to delays, unreliability of delivery times and added trucking costs which are affecting the economic competitiveness of the GTA. Since there are no freeway routes between southwestern Ontario and either northern or eastern Ontario without passing through the GTA, these delays and additional costs have a negative effect on industries throughout Ontario.

Surface transit service levels have also been significantly degraded by increasing levels of road congestion. Not only has this contributed to reduced speeds and increased travel times as experienced by riders, but the transit operators have also been forced to invest in additional equipment to provide the same frequency of service under slower peak period conditions and are also experiencing increased operating costs because of slower speeds.

Reflecting the relative stability of population within Metro Toronto, and the impacts of growing road congestion on the effectiveness and efficiency of feeder bus services, rapid transit ridership on the subway and LRT network in Metro has been relatively static. The major growth in commuting trips has been from areas of high population growth beyond Metro's boundaries to growing employment opportunities in the Metropolitan core and other parts of Metro, such that there has been a very rapid increase in commuting trips crossing the Metropolitan boundary. Extensions of the radial rapid transit lines from Metro into the adjacent regions have not been forthcoming, as noted earlier, such that the rapid transit network has not borne a proportionate share of this increased demand.

The growth in these longer commuting trips from the regions to Metro, particularly to the downtown, has all been absorbed by the steadily increasing capacity of GO Transit, which has experienced a.m. peak period ridership increases to Union Station from about 10,000 riders in 1975 to over 36,000 riders in 1990. Deficiencies in the GO Transit network include congestion at Union Station, lack of two-way and all-day service on most of the lines, and deficiencies in parking and coordinated feeder transit services. Current provincial plans and funding programs are aimed at introducing full service (two-way service in peak periods at 20 minute headways or less and hourly service in both directions during the remainder of the day) on all seven commuter rail lines, adding additional stations, and improving the fare integration and service coordination interfaces with local transit systems.

Congestion at the Yonge/Bloor subway station and on the Yonge line south of Bloor has been a problem in the rapid transit system (although it is currently less severe during recession conditions). The main deficiency in the rapid transit network, however, is the need for additional links in the system which would enable it to play a more major role in serving existing and growing travel demand in the GTA and could also help to relieve the Yonge/Bloor congestion problem. The most significant deficiency in surface transit, in addition to the congestion delays referred to earlier, is the lack of consistent coverage and service levels in some of the regions adjacent to Metro Toronto and the significant lack of fare integration and service coordination for riders crossing municipal boundaries. As a result, while transit modal split increased marginally in the suburban municipalities, it is currently so low (in the range 7-11% in the peak period) that its impact in helping to relieve road traffic congestion is minimal in those areas.

2.2.2 CAPITAL PROGRAMS AND BUDGETS

Transportation planners at the provincial and municipal levels are involved in a continual process of transportation planning, programming, budgeting and implementation in order to meet transportation needs in the GTA. Periodically, comprehensive land use/transportation planning studies are carried out to define such needs comprehensively and over the longer term, at the GTA-wide level, including studies carried out in the early 1960s ***(MTARTS),*** the late 1960s ***(TCR),*** the early 1970s ***(COLUC*** and ***MTTPR)*** and the early 1990s ***(Urban Structure Concepts Study),*** and by individual regional municipalities and area municipalities.

Drawing on this work and on year-to-year consideration of existing and short term deficiencies, the various jurisdictions prepare one year and five year capital work programs and budgets which, in some jurisdictions, are also extended to a ten or even a twenty year horizon on a less specific basis. Generally, this process is based on existing Official Plans which reflect trends in terms of land use density/mix and relative use of the various travel modes, although increasingly stringent financial limitations and (in more built-up areas) space limitations have led to increasing emphasis

on transit, both to expand the effective capacity of the road network and, through rapid transit and commuter rail, to provide substantially increased capacity in addition to the road network.

The existing five year capital works budget for GTA transportation is shown in Exhibit 2.1, for the period 1992-1996. The budget estimates shown are preliminary in the sense that changes are possible, and indeed are likely regarding individual items, for the latter four years of the period. As indicated, the total five year capital works budget, including regional roads, provincial highways, GO Transit and TTC and Mississauga rapid transit, is about $7.1 billion ($1991) or about $1.5 billion per year. Of this total, regional road budgets comprise about $1.5 billion, provincial highways about $1.0 billion, GO Transit about $1.2 billion and TTC and Mississauga rapid transit about $3.3 billion (the latter includes the ***Let's Move*** initiatives but not purchase of land). In comparison, during the five years 1986-90 capital expenditures by GO Transit were about $0.7 billion and those by the TTC were about $0.5 billion. The very substantial increase in TTC expenditures for 1992-96 shown in Exhibit 2.1 is based on the assumption that the ***Let's Move*** rapid transit extensions would be initiated on a large scale during the next five years. The GO Transit five year budget numbers may also be optimistically high. Capital budgets of other transit properties in the GTA were not included because not all were readily available.

2.2.3 EXISTING SYSTEMS AND PLANNED EXPANSION

The existing transportation networks and planned extensions to them are illustrated in Exhibit 2.2 (A) for the highway network, Exhibit 2.2 (B) for commuter rail, and Exhibit 2.2(C) for rapid transit.

Highway Network

As shown in Exhibit 2.2 (A), the existing system of 400-series highways and other provincial highways provide a grid of major roads serving the GTA, with connections to the Gardiner Expressway and Don Valley Parkway owned and operated by Metro Toronto. Planned expansions include widening of Highway 401 through the eastern part of Metro Toronto and adjacent areas of Durham region and in major sections through Peel and Halton regions, construction of Highway 407 (with initial priority to the sections between Highway 10 and Airport Road in the west and Dufferin Street and Highway 404 in the east), and Highway 403 across Halton region. Planned widenings of other major roads include Highway 400 and Highway 404 between Highway 401 and Major MacKenzie Drive, Highway 48 between Highways 401 and 407, Highway 427 north of Highway 401, and others as shown on the exhibit.

Commuter Rail

Current plans include moving towards full service eventually on all seven lines as shown in Exhibit 2.2 (B), with initial emphasis (for those lines now having peak period/peak direction service only) on expanding to all-day service by means of one train set operating throughout the day which would provide off-peak service in both directions at a frequency dictated by the length of the line. In addition, there are planned extensions of the Richmond Hill line to the Bloomington Side Road, of the Stouffville line to Goodwood, and of the Lakeshore East line to Harmony Road at the eastern edge of Oshawa.

EXHIBIT 2.1
FIVE YEAR CAPITAL BUDGET
FOR GTA TRANSPORTATION

(GROSS EXPENDITURE IN 1991 $000'S)

	1992	1993	1994	1995	1996	TOTAL
REGIONS: ROADS	241,273	286,425	335,605	305,730	288,732	1,457,765
PROVINCIAL HIGHWAYS	149,900	174,900	212,600	267,400	247,700	1,052,500
GO TRANSIT	133,000	231,000	262,000	323,000	284,000	1,233,000
T.T.C. (1) AND MISSISSAUGA TRANSIT	148,303	406,027	546,160	953,873	1,267,130	3,321,493
GRAND TOTAL	672,476	1,098,352	1,356,365	1,850,003	2,087,562	7,064,758

(1) INCLUDES ALL LET'S MOVE INITIATIVES CURRENTLY UNDER ENVIRONMENTAL ASSESSMENT REVIEW BUT NOT PURCHASE OF LAND.

EXISTING AND PLANNED TRANSPORTATION SYSTEM

HIGHWAY/FREEWAY NETWORK

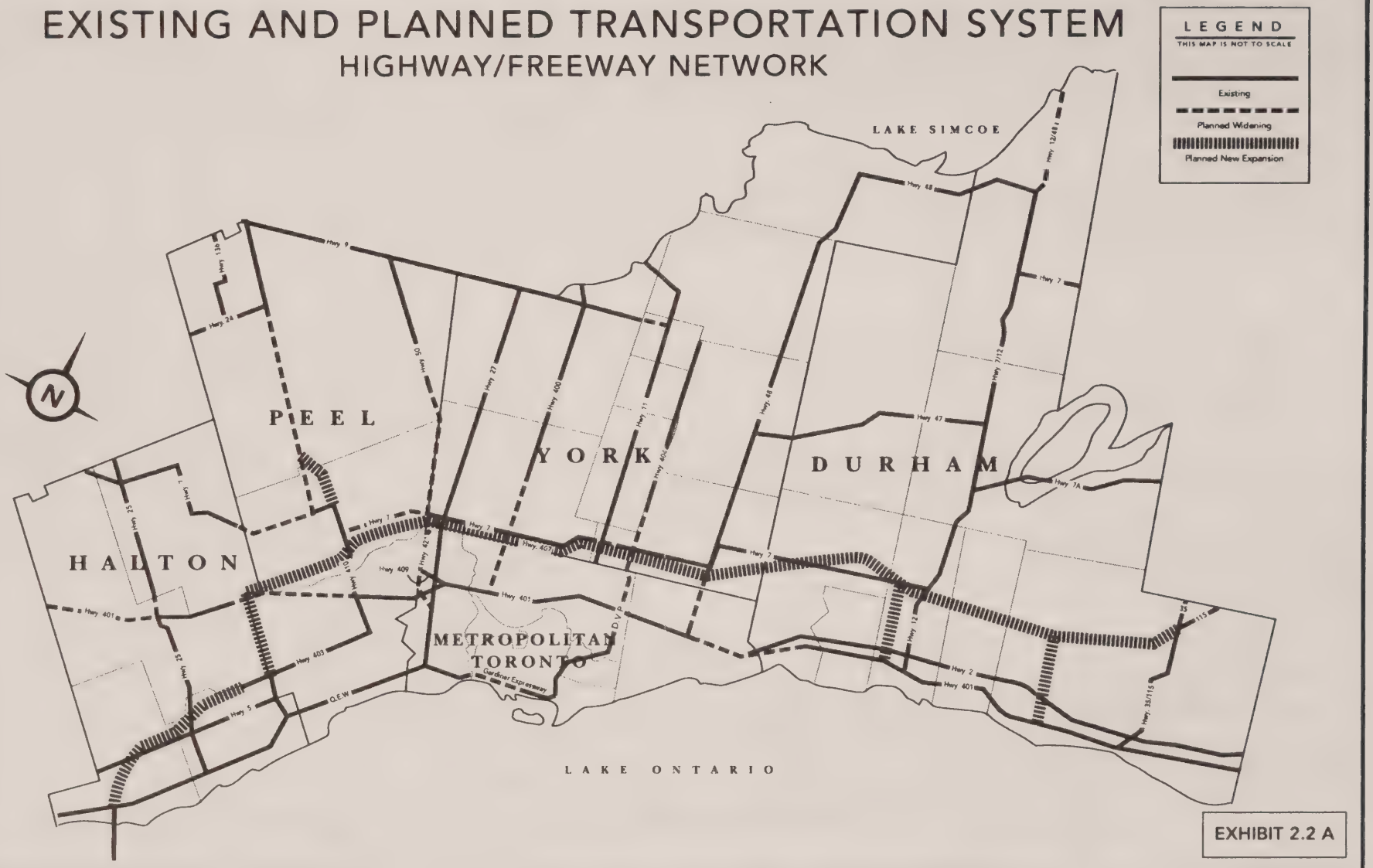


EXHIBIT 2.2 A

EXISTING AND PLANNED TRANSPORTATION SYSTEM

COMMUTER RAIL

EXHIBIT 2.2 B

Rapid Transit

Planned extensions to the existing Yonge/University and Bloor/Danforth rapid transit lines, as shown in Exhibit 2.2 (C), are essentially as promulgated some time ago in the Let's Move program: extension of the Spadina subway and its connection eastward (forming "the loop") to the Yonge subway; extensions of the Bloor subway west and of the Scarborough RT northeast to Sheppard Avenue; construction of the Sheppard subway between Yonge Street and the Scarborough City Centre, the Spadina LRT line between Bloor and Queens Quay, and the Eglinton RT from the Spadina subway to the west Metro boundary; westward extension of the Harbourfront LRT; and construction to the Mississauga Transitway along Highway 403 through Peel region, connecting to the Eglinton LRT. In conceptual terms, there is also planned protection for future provision of rapid transit in the Highway 407 corridor from Winston Churchill Boulevard in the west to Highway 48 in the east.

The Working Group took as its starting point the existing transportation system, bearing in mind planned extensions plus also considering possible alterations in order to serve and help shape the Nodal land use concept.

2.3 TRANSPORTATION PRINCIPLES AND MAJOR ISSUES

The Working Group established a number of basic principles for planning and delivering transportation in the GTA. These are presented below along with a brief discussion of major issues, under three basic headings:

1. Land Use and Urban Design;
2. Transportation Networks;
3. Transportation Management.

2.3.1 LAND USE AND URBAN DESIGN

Major points to be emphasized in achieving land use structure and urban design features which support and can be well-served by transportation systems are as follows:

- work towards a more structured, compact, mixed-use urban form in terms of:
  - nodes and corridors of higher density, particularly along transit routes and around major commuter rail stations, rapid transit stops and intermodal transfer points (gateways);
  - industry served by highways and rail;
  - streetscapes designed to encourage pedestrians and, where possible, cyclists as well as transit operations/use and auto/truck traffic;
  - roads and transit should lead development where possible in order to provide basic road access while building the "transit habit"

EXISTING AND PLANNED TRANSPORTATION SYSTEM

RAPID TRANSIT

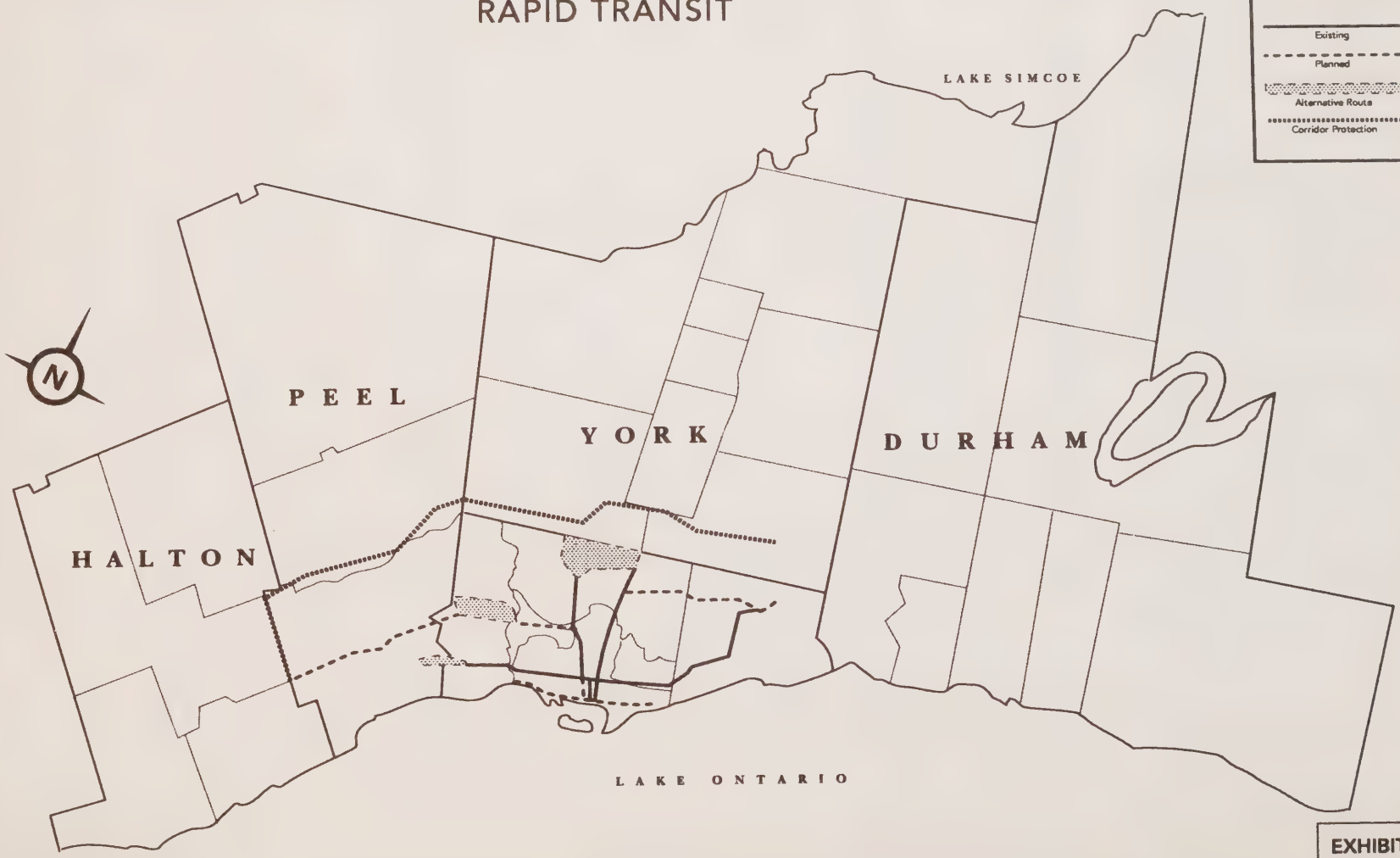


EXHIBIT 2.2 C

- allowing for evolution in terms of land use intensification and redevelopment, network infilling and expansion, infilling/redevelopment of transfer nodes and shopping centres.

An integrated approach to land use and transportation planning/delivery is required to achieve these principles, which are aimed at providing capacity for necessary automotive/truck traffic while encouraging use of transit, walking, cycling rather than automobile-dependence, for trips which have modal choice discretion. The ***Transit-Supportive Land Use Planning Guidelines***, currently being published by the provincial government, provides substantially more details on these principles.

2.3.2 TRANSPORTATION NETWORKS

Key network planning principles include the following:

- networks should provide continuity, appropriate coverage and functional integration among the various transportation modes, as well as integration with land use:

  - network continuity should be achieved, where possible, to allow direct routing for long as well as shorter trips and avoid the need for transfers;

  - generally in the GTA, a grid network would appear most appropriate for major highways and regional/arterial roads, while a more radial network applies for the commuter rail and rapid transit networks; increasingly, however, cross connections will be required between the radial "spokes" in the rail/rapid transit networks such that the rapid transit network, in particular, will become more grid-like as it evolves;

  - modal integration requires that the road, commuter rail and transit networks be tied together at a large number of transfer nodes (gateways) and that these be integrated with development nodes, parking, pedestrian and cyclist facilities as appropriate, with every attempt to avoid unnecessary transfers (e.g. because of changes in technology) along major rapid transit lines;

  - land use-network integration is necessary, including commuter rail and/or rapid transit links between major nodes and the Toronto Central Business district (CBD), while roads and transit (rapid and surface transit, as appropriate, including express buses) should be oriented to link intermediate nodes to adjacent major nodes. Generally, the networks should reflect the different capacity, speed and service level characteristics of the various modes and sub-modes, and apply them in a manner compatible with the hierarchy of nodes and corridors to be served;

  - the same principles of network continuity, coverage and function also apply to the provincial highway and rail networks in and around the GTA, particularly to serve goods movements, recreational and other intercity trips and also to minimize community impacts of such trips by means of by-passes where feasible;

- early action is essential to protect corridors required for future implementation of more complete and expanded transportation networks in the longer term.

2.3.3 TRANSPORTATION MANAGEMENT

The manner in which the transportation system is managed is critically important:

- operations and control, facility design, user information system, regulations and pricing should be applied to influence both the **demand** and **supply** of transportation such that the system will be used more efficiently:

  - the removal of on-street parking/loading, more integrated and responsive traffic control and information systems, and related traffic management measures should be applied as appropriate so that the road network will achieve higher throughput of **people** and **goods** rather than just vehicles;

  - commuter rail service levels and capacities can be increased by providing more trains, longer trains, more stations and better transit feeder and parking arrangements at stations;

  - subway and LRT capacities and service levels can be enhanced by improved signal systems, selective improvement of bottleneck stations and terminal points, and appropriate network extensions;

  - surface transit can be improved by establishing a network of High Occupancy Vehicle (HOV) lanes, dedicated transit lanes, transit priority signals, and related measures;

  - unnecessary transfers, loss of capacity and extra fares which currently create transit barriers at municipal boundaries can be removed by fare integration and service coordination, and similar measures are required at modal interfaces;

  - pricing of parking, transit, and road facilities can be used not only to provide a higher level of user funding in some instances but also to influence user behaviour such that transportation facilities which are chronically congested in peak periods may experience some relief, and users will have an incentive to use more efficient modes.

A basic element of the transportation strategy proposed by the Working Group is to apply appropriate transportation management measures in the short term and on an expanded basis over the longer term to optimize use of the transportation network so that its capacity is used as efficiently and effectively as possible. Development of the Nodal land use concept will also work to this end as described earlier. Required network expansion to serve ongoing growth can then be tailored to the needs of the Nodal land use concept reflecting optimum use of the capacity of existing and future transportation networks, facilities and services.

2.3.4 TRENDS, ISSUES AND POSSIBLE INITIATIVES

Exhibit 2.3 summarizes a number of important transportation trends, issues and possible initiatives affecting the GTA and adjacent areas, including rapid transportation demand growth, capacity limitations, increased in-commuting from adjacent areas to the GTA, recreational traffic growth, and heavy truck traffic. These trends, the underlying costs/issues, and various possible initiatives were considered by the Working Group as it identified transportation needs and improvement options.

2.4 NEEDS AND IMPROVEMENT OPTIONS

2.4.1 REMAINING TRANSPORTATION NEEDS

In the context of the above transportation principles and major issues, and given the major growth in population and employment anticipated over the coming 30-40 years in the GTA, it is clear that there are very substantial needs for transportation system improvements over the coming decades, beyond those identified above in the five year capital program/budget.

Major transportation needs to serve the Nodal development concept, over and above the new facilities identified in the five year capital program, and including the benefits of system optimization, include the following:

- completion of the planned network of 400-series highways, accelerated to the extent possible, including design and operational arrangements to enable effective express bus service and HOV/transit priority lanes to be provided;

- rationalization of the GTA rail network to use it most efficiently and effectively for freight transportation and for commuter rail and intercity rail (including high speed rail) services;

- continuing expansion of commuter rail coverage by introducing full service on all lines, establishing new linkages (e.g. on the north Toronto subdivision and possibly on the MacTier, Havelock and Belleville subdivisions), adding more stations and providing more effective interfaces with other modes;

- additional rapid transit corridors/lines and other transit improvements affecting surface transit, as noted in the previous section, possibly combined with institutional changes for more coordinated planning and delivery of transit service;

- road widenings and provision of missing links in the municipal arterial road network, coupled with HOV/transit priority lanes and other design and operational changes to serve transit, truck, pedestrian and bicycle trips effectively as well as auto trips;

- transportation/land use integration, providing "transparent" interchanges among urban transportation modes and to/from major intercity

EXHIBIT 2.3: TRANSPORTATION TRENDS, ISSUES AND POSSIBLE INITIATIVES

SUBJECT	TREND INDICATORS	CAUSES/ISSUES	POSSIBLE INITIATIVES
• Rapid Transportation Demand Growth in GTA and Adjacent Areas	• 1961: 4.9 M. daily trips • 1986: 11.6 M. daily trips; up 136% • 2011: 16.1 M. daily trips; up 39%	• Smaller, more adult households • Live/work relationship imbalance • More women in the work force • Higher incomes and auto ownership • Longer trips; social/economic costs • Air pollution/acid rail from automotive emissions	• Shorter trips through better land use • More use of public transportation where feasible and cost/effective • More efficient use of transportation facilities/services • Improve automotive propulsion
• Capacity Limitations in GTA and some Adjacent Areas	• Growing congestion • Lengthening of peak periods • Increased trip times and costs	• Transportation funding limitations • Environmental/community concerns • Increased user costs and economic impacts	• Improve roads and transit in GTA • Emphasis on transit • Urban infill-intensification in GTA • Joint public/private funding • Provincial leadership/coordination
• Work trips crossing the GTA boundary	• Inbound: 58,000 in 1981 75,000 in 1986, up 29% • Outbound: 25,000 in 1981 24,000 in 1986, stable	• High GTA land/housing prices • Urban Overspill • Low density development	• Extend existing urban areas rather than creating new towns or encouraging country estate development • Selective rail expansion to major urban centres adjacent to GTA
• Recreational Traffic Growth	• Strong demand for cottages • 5-15% annual growth in AADT on recreational routes	• Baby boomers' buying cottages • Retirees moving to Hinterland • Tourist traffic increases	• Widen key recreational roads • Improve bus services to recreational areas • Improve GTA recreational opportunities
• Heavy Truck Traffic	• >15% trucks on Hwy. 401, QEW, Hwy. 69 and others	• Rapid economic growth • Loss of rail traffic to road • Just-in-time deliveries • High economic costs of truck delays • Traffic safety, capacity and environment	• Widen/improve major highways • Encourage use of intermodal rail (eg. piggyback and container on flatcar, roadrailer) service where feasible

Source: Adapted from Infrastructure Issues and the GTA Hinterland, by N.A. Irwin, presented to the Central Ontario Planners Conference, 1989.

transportation terminals at Pearson Airport, Union Station, and other air, rail and bus terminals.

2.4.2 OPTIMIZING USE OF THE EXISTING SYSTEM: SHORT TERM MEASURES

Recognizing the weaknesses, problems and needs identified earlier, a number of strategic initiatives are possible to optimize the use of existing infrastructure and facilities with a view toward increasing transit ridership and, in general, achieving more efficient use of the road and transit systems.

A long list of system optimization measures is presented in Exhibit 2.4. Part (A) of that exhibit deals with **demand** management (aimed at influencing user demand behaviour) and Part (B) deals with **supply** management (system design, operations, communications and control measures). It will be noted also that the exhibits list respectively short term measures (which could be carried out during the next five years or so) and longer term measures (which would probably require 10-20 years to be effectively implemented).

The Working Group considered these and related measures aimed at achieving, to the maximum extent feasible, greater efficiency and capacity in the existing transportation system. It is, of course, recognized that significant steps of this nature have already been taken by various jurisdictions in the GTA; the measures described below were given the highest priority by the Working Group as **additional** measures to this end.

Transit System

High priority actions aimed at achieving greater use of transit and delivering transit services more efficiently in the short term are summarized below:

- **Transit Priority Measures and HOV/Transit Priority Lanes**: the Metropolitan Toronto Transportation Department has recently prepared a report identifying a network of major roads on which certain lanes would be designated for the exclusive use of transit vehicles and other high occupancy vehicles during the peak period, and other municipalities in the GTA are also considering or implementing lanes of this type. The Working Group considers this to be a very high priority measure since it achieves both increased service levels and efficiency of surface bus operations and, by making them more attractive, attracts more people to ride transit and thereby helps relieve road congestion and related environmental problems. HOV/transit priority lanes should be combined where feasible with traffic signal system improvements to provide priority to transit vehicles along with other operational changes, such as less on-street parking and loading, to enhance the operation of such lanes. A network of HOV/transit priority lanes should be established throughout the GTA where warranted by generated transit/HOV volumes. HOV/ transit priority lanes should not be restricted to arterial streets but should also be applied as appropriate on provincial highways (e.g. Highways 2, 5, 7, 10 and 11) and also on 400-series highways (e.g. Highways 401, 403, 404, 407, 410 and 427) as appropriate;

EXHIBIT 2.4: LONG LIST OF SYSTEM OPTIMIZATION MEASURES (A) DEMAND MANAGEMENT

SHORT TERM	LONGER TERM
HIGHER VEHICLE OCCUPANCY/LOADS	**SHORTER TRIPS, MORE EASILY SERVED BY TRANSIT**
- Ride-sharing	- Compact Urban Form
- Truck Backhaul "Matching" Service	- Jobs/Population Balance
	- Housing/Job Mix

SPREADING OF PEAK DEMANDS

- Flexible Hours
- Differential CBD Parking Rates by Time/Duration
- Nighttime Truck Deliveries
- Reduced Off-Peak Transit Fares
- Road Pricing/Tolls
- CBD Vehicle Restrictions

INCREASED TRANSIT MARKET SHARE

- Increased Destination Parking Charges
- Reduced Employee Parking Subsidies
- Increased Employee Transit Subsidies
- Transit Fare Integration/Schedule Coord.
- Transit/Traffic Information
- Pricing Structure for Transit & Related Parking
- CBD Parking Restrictions
- Public Information on Environment/ Energy Trade-offs
- Road Pricing/Tolls
- CBD Vehicle Restrictions

INCREASED USE OF RAIL

- Higher Truck Charges for Road Use
- Truck Weights/Dimensions Reg's
- Commuter Rail Integration/Coord.
- Road Pricing/Tolls
- CBD Vehicle Restrictions

Source: Opportunities for Enhancing Mobility in the GTA, by IBI Group, prepared for the Ministry of Transportation, Ontario, 1990

EXHIBIT 2.4: LONG LIST OF SYSTEM OPTIMIZATION MEASURES (B) SUPPLY MANAGEMENT

SHORT TERM

IMPROVED INFORMATION

- Expanded "Situation Room(s)"
- Expanded Car Radio Info.
- Real-Time TV Info.
- Transit Comm./Info. System
- Signed Hospital Access Routes

MAINTEN./REHAB. SCHEDULING

- Less Deferral
- Night/Weekend Scheduling

LONGER TERM

NETWORK EXPANSION/ INTEGRATION

- Arterial Roads/Freeways/Tollways
- Closer Arterial Spacing on Suburban Areas
- Commuter Rail Lines/Stations/Service
- Rapid Transit: Subways/LRT/Busways
- Express Bus Extensions to Gateways
- Joint Road/Transit Design (e.g. Hwy. 407)

INCREASED TRANSIT MARKET SHARE

- Transit Priority/Expansion/Pricing
- Road Pricing/Tolls
- CBD Vehicle Restrictions: Auto-Free Zones
- CBD Parking Restrictions

REDUCED CURB FRICTION

- Less On-Street Parking/Loading
- More Off-Street Parking
- Retrofit Off-Street Loading Facilities
- Curb Loading Bays
- More Bus Bays
- Relocated Transit Stops
- Curb Use Enforcement
- Improved Building Set-backs/Design and Curb/Bays Design to Reduce Blockage of Moving Lanes

IMPROVED OPERATIONS/CONTROL

- Area Traffic Control
- Corridor Management/FTMS
- Transit Operations and Control
- One-Way Streets and Reversible Lanes
- Intersection Turning Lanes/Phases
- Turn Prohibitions and Spillback Enforcement
- Neighbourhood Traffic Barriers
- "Smart Cars"
- "Smart Corridors"

DIFFERENTIAL PRIORITIES

- Transit and HOV Lanes
- Designated Truck Lanes/Routes
- Emergency Vehicle Priority
- Peak Period Truck Restrictions
- CBD Auto Restrictions

Source: Opportunities for Enhancing Mobility in the GTA, by IBI Group, prepared for the Ministry of Transportation, Ontario, 1990

- **Transit Fare Integration and Schedule Coordination**: it is essential that "seamless" transit services be provided throughout the GTA, such that artificial barriers (e.g. unnecessary transfers and double fares, lack of service coordination, duplicate "closed door" services) are eliminated at municipal boundaries, interfaces between surface and rapid transit/commuter rail services, and other places where relevant. Significant fare integration steps have been taken between GO Transit and a number of municipal transit systems and a major effort is now underway to achieve fare integration and service coordination across the west Metro boundary between Mississauga and Etobicoke. Such measures should be introduced wherever required in the GTA in the near term. MTO transit subsidy policies should be modified as necessary to avoid their working against such measures. The Working Group is of the opinion that fare integration and service coordination can be achieved effectively throughout the GTA in the short term and without the need for institutional changes such as amalgamating transit properties or creating an overall transit federation or operating authority. Experience in European metropolitan areas and elsewhere has demonstrated this. An examination of transit modal share for trips crossing municipal boundaries shows clearly that ridership in these areas is substantially below the levels which could be achieved if fare integration and service coordination were effectively in place, and this is one of the most cost effective measures which can be undertaken in the short term to achieve higher use of transit;

- **Transit Communications and Control**: the TTC pioneered during the 1970s and 1980s in the development of an advanced communications, information and control system, which has been installed throughout its entire network. This system provides greatly improved real-time information to riders regarding when the next transit vehicles will be arriving at a given stop. It also provides the system operators with essential information on vehicle locations, load factors, other status indicators and emergency situations, which allow the operators to provide significantly more reliable and efficient service. Mississauga Transit has also pioneered in installing a bus location monitoring and passenger information system. The Working Group recognizes the importance of these innovations in providing more efficient and effective transit services and proposes that improved transit communications, information and control systems should be implemented where practicable throughout the GTA;

- **Employer Tax Break for Subsidizing Transit Passes**: it is well-known that existing tax rules encourage employers to provide parking spaces for employees but provide no encouragement for employers to subsidize transit passes on behalf of employees. The Working Group proposes that this situation be corrected by eliminating or reducing the tax incentive to provide employees with free parking spaces and by providing a direct tax incentive for employers to subsidize transit passes. If possible, it is suggested that the provincial government try to persuade the federal government to change corporate tax rules to this effect; if this is

unsuccessful it may be possible to change provincial taxes (e.g. the Commercial Concentration Tax) to help achieve similar objectives;

- **Pricing Structure for Transit and Related Parking**: the total daily cost of commuting by transit, particularly for those living in suburban areas and working in central areas, includes not only the transit fare(s) paid but also may include the cost of parking at the suburban transit station. Similarly, the daily cost borne by an auto commuter to central areas (unless the employer provides free parking) is strongly influenced by parking rates in the destination area. The Working Group proposes that an integrated approach be taken to the pricing of parking in both locations as well as pricing of the transit services themselves, with a view to providing greater incentives for transit use as opposed to auto use and, within each mode, greater incentives for off-peak travel. Measures of this type include setting transit fares and station parking at relatively low levels commensurate with appropriate cost recovery (for example, the free parking at subway station recently introduced by the TTC), increasing parking rates in central areas where high levels of transit service are available, and providing price discounts for those using the facilities in off-peak periods;

- **Commuter Rail Enhanced Service/Integration/Coordination**: recognizing the great success of GO Transit services in greatly expanding their ridership base during the last two decades and the fact that very substantial additional commuter rail capacity can be provided to all sectors of the GTA at relatively modest cost using existing rail rights-of-way, the Working Group proposes that continuing expansion of commuter rail services be given high priority in order to achieve at least all-day service on all seven existing lines as quickly as possible. At the same time, more stations and a number of station relocations should be considered in order to provide greater ease of access to the commuter rail network and closer integration with municipal transit services and park-and-ride access. As noted earlier, fare integration and service coordination should also be achieved at all such interface points, along with integrated land use planning to achieve more compact, mixed-use development around GO Transit stations. Similar steps should be taken around major rapid transit stations.

Road System

- **Freeway Traffic Management Systems**: the MTO has instituted Freeway Traffic Management Systems on Highway 401 and the QEW/Burlington Skyway in the GTA and vicinity. The Metropolitan Toronto Transportation Department is planning and designing a similar system in the Gardiner/Lake Shore corridor. Advanced electronic systems are used to provide early detection of accidents and other incidents and information is provided to drivers through changeable message signs and other means such that highway users are able to avoid congested areas, be prepared for hazardous conditions ahead and be advised regarding the duration of traffic delays. Systems of this nature, and related area traffic control

systems on urban arterial networks can provide significant reductions in traffic delays, accident rates, vehicle emission levels and operating costs, benefitting not only automobile drivers but also transit vehicles and trucks using the road network. The Working Group endorses continuing efforts to apply such systems throughout the GTA as appropriate, in order to help use the network of major and arterial roads as efficiently as possible;

- **Less On-Street Parking/Loading**: this measure applies to arterial roads and, as noted earlier, is particularly important on roads where HOV/transit priority lanes are implemented. Even in other situations, however, reduction of on-street parking/loading allows the road capacity to be used to its fullest extent, especially when most required during peak periods. Related steps to provide off-street parking, at levels commensurate with modal split targets and greater use of transit, should also be considered in order to avoid economic hardship to merchants and other economic activities;

- **Intersection Improvements**: urban arterial roads are the workhorse of the road network for automobile, transit and truck traffic. The capacity of the network is dictated by the capacity of its intersections. Improvements to provide turning lanes, turning signals and related operational/control measures are important ways of improving intersection capacity, efficiency and safety. The Working Group therefore proposes that such improvements be included in the high priority list of short term system optimization measures, with due consideration of the need to serve transit, truck, pedestrian and bicycle trips safely and conveniently at such intersections, as well as auto trips.

It will be noted that the emphasis in this section is on short term measures. Longer term measures, including policies and possible institutional and pricing initiatives are discussed below in Section 2.5.5.

2.4.3 EXPANDING THE NETWORKS

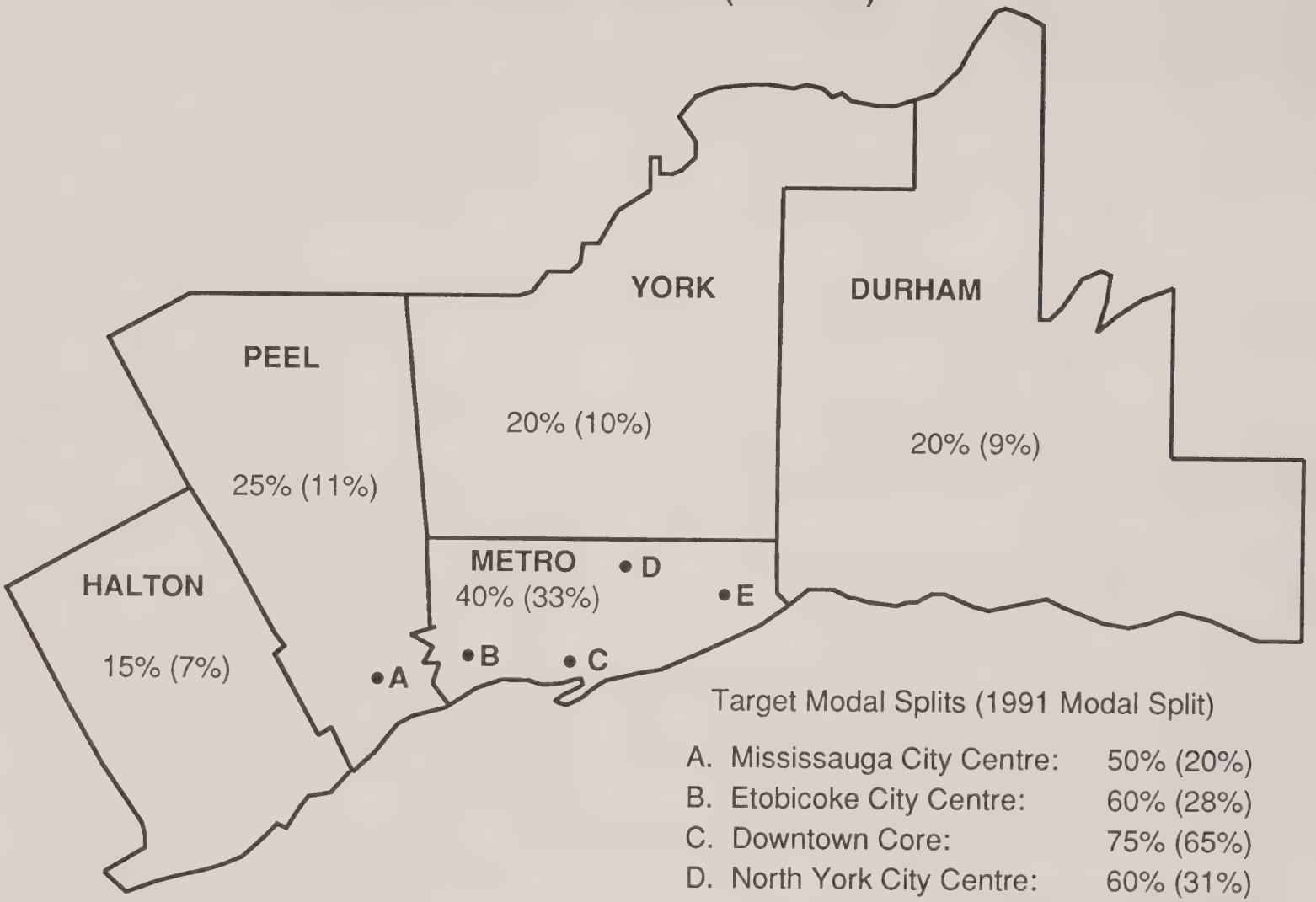
As noted earlier, it is clear that it would be impractical in most parts of the GTA to rely solely on private automobile and truck transportation. Increasing reliance on a growing transit market share will be required to provide necessary transportation capacity, including surface transit and various forms of rapid transit and commuter rail. This will require increased integration of all transportation modes, both as part of a comprehensive road and transit transportation network and through close integration of the transportation network with the Nodal land use concept, transfer nodes (gateways) and related interfaces.

In order to quantify this requirement, the Working Group examined existing transit modal shares at major cordons and screenlines throughout the GTA and recent and anticipated trends in those shares, and used this as a basis for proposing future modal split targets (e.g. for the year 2021) in the various parts of the GTA.

Exhibit 2.5 summarizes existing transit shares (modal splits), including both municipal transit and GO Transit riders. Considering the west, north and east components of the three major Metro cordons, the existing transit shares at the Metro boundary are 24.1%, 10.3% and 17.7%,

EXHIBIT 2.5: TARGET MODAL SPLITS AND 1991 TRANSIT MODAL SPLITS

AM PEAK PERIOD TRIPS (6 - 9 AM)



Target Modal Splits (1991 Modal Split)

A.	Mississauga City Centre:	50% (20%)
B.	Etobicoke City Centre:	60% (28%)
C.	Downtown Core:	75% (65%)
D.	North York City Centre:	60% (31%)
E.	Scarborough City Centre:	60% (30%)

respectively. At the intermediate cordon they are 49.8%, 31.1% and 49.4%, respectively. At the central area cordon they are 64.5%, 75.1% and 56.4%, respectively. These modal split levels apply to inbound trips during the a.m. three hour peak (6:30-9:30 a.m.) for the outer and suburban cordons and 7:00-10:00 a.m. for the Central Area cordon). The overall municipal transit modal split levels within each of the five regional municipalities of the GTA (based on the 1986 Transportation Tomorrow Survey) are about 35% in Metro Toronto, 9% in Durham, 10% in York, 11% in Peel, and 7% in Halton. Recent transit shares of trips to suburban city centres are, respectively, about 20% to Mississauga, 28% to Etobicoke, 30% to Scarborough and 31% to North York.

The Committee considered the requirements for increased transit market shares in order to meet the transportation needs and these are also shown on Exhibit 2.5. Within this context, and reflecting the results of various transportation planning studies throughout the GTA, the Working Group recommends the following target modal splits by 2011-2021 (existing modal splits are shown in parenthesis):

Metro Boundary Cordon	35%	(10-24%)
North York, Etobicoke and Scarborough City Centres	60%	(28-31%)
Mississauga City Centre	50%	(20%)
Central Area Cordon	75%	(65%)
Within Metro Toronto	40%	(33%)
Within Durham Region	20%	(9%)
Within York Region	20%	(10%)
Within Peel Region	25%	(11%)
Within Halton Region	15%	(7%)

These target modal splits are reflected in the infrastructure recommendations presented below.

2.5 A TRANSPORTATION VISION FOR THE GTA

2.5.1 SERVING AND SHAPING THE GTA

Drawing on its findings regarding deficiencies, issues, system planning principles and improvement options as described in the previous sections, the Working Group defined in conceptual terms a transportation vision to serve and help shape the Nodal urban structure concept as defined by the Urban Form Working Group. As described in the ***Urban Structure Concepts Study (Background Report No. 1: Description of Urban Structure Concepts)*** a relatively compact suburban node with 100,000 people and 50,000 jobs might typically require enough commuter rail and rail rapid transit capacity to move about 1,000 work trips to the metropolitan Central Area and an additional 2,000 work trips to the remainder of Metro in the peak hour, assuming that 50% of the work trips would be by transit and the other 50% by auto. The transit market share could be considerably higher than that (e.g. 85-90% transit use to the CBD) based on the level of transit service provided and on other factors, which would add to the required commuter rail/rapid transit capacity but reduce congestion pressures on the road network. An additional 6,000 or 7,000 trips directed to work opportunities in the regions surrounding Metro would require enough road capacity to serve 4,000-5,000 person trips by auto in the peak hour with the remainder carried on rapid and local transit, while the remaining 6,000 or 7,000 work trips from the node would be served by a combination of local transit, automobile and pedestrian travel, depending on the density, urban form and available transportation services in the node itself.

Typically, therefore, major nodes with a population of 100,000 or greater would ideally be located on one or more commuter rail or rapid transit lines serving trips to the metropolitan downtown area and to other nodes and work opportunities in the remainder of the GTA. The work trip volumes and required capacities would be correspondingly smaller for intermediate nodes such that other forms of rapid transit (e.g. express buses, possibly on HOV/transit priority lanes and/or on busways) could be considered in some instances. In general, as stated earlier in Section 2.3.2, the five major nodes shown in Exhibit 1.5 should be directly connected to the metropolitan CBD by commuter rail and/or rail rapid transit services. The intermediate nodes should be connected to the nearest node(s) and, where appropriate, to the metropolitan CBD by commuter rail or rail rapid transit where available or by express bus, light rapid transit (LRT) and/or local transit services. Desirably, major nodes should be served by at least one 400-series highway passing within one or two kilometres of the node (but ideally not through the middle of the node), and all nodes should be served by a continuous grid of arterial and collector roads, both within the node and linking it to adjacent nodes as appropriate.

The other essential principle stressed by the Working Group in developing its transportation vision was that of **integration**: both between the transportation system and the land use patterns which it serves, and among the various modes and terminals making up the transportation system. The latter includes not only the basic elements of roads, commuter rail, rapid transit and surface transit, but also the major interchange points among these modes and with intercity transportation systems (e.g. rail, air, bus and marine, rail and truck freight terminals).

2.5.2 RAPID TRANSIT AND COMMUTER RAIL NETWORK

The basic rapid transit and commuter rail elements of the transportation vision are illustrated in Exhibit 2.6 (A).

Rapid Transit and Commuter Rail

The intent is to develop a system which will provide direct, continuous service for both radial and cross-town trips, avoiding discontinuities in system links, building on the existing rapid transit network, and providing direct service to all five major nodes and the metropolitan CBD. This is achieved by means of three east-west rapid transit lines in Metro Toronto (in addition to the existing Bloor-Danforth subway), extensions of the four existing rapid transit lines (e.g. Bloor, Spadina, Yonge, Scarborough) across the Metro boundary into Peel and York regions, and a circumferential rapid transit line (probably express buses on busway and/or HOV/transit priority lanes) tying together the radial lines and providing direct service among nodes at Markham, Langstaff, Vaughan, Brampton and Mississauga with a connection from the north to Pearson Airport. A rapid transit extension from the Bloor subway would provide direct radial service to the Mississauga City Centre and extensions of the Spadina, Yonge and Scarborough rapid transit lines would provide radial services, respectively, to Vaughan, Langstaff and Markham. A major east-west line (e.g. the Mississauga Transitway) would serve the Highway 403 corridor in Peel, tying to a line along Eglinton Avenue in Metro from the west boundary all the way east to the Danforth subway line. A second east-west rapid transit line, farther north in Metro, would link the Scarborough City Centre with the North York City Centre, westward from there to the Pearson International Airport area, and from there south to connect with the Bloor subway line. East-west LRT service would also be provided along the Central Waterfront, on one or more alignments following Queen Street/the Queensway and/or an alignment closer to the Lake in the Central Area in accordance with proposals emerging from the Royal Commission on the Future of the Toronto Waterfront.

A TRANSPORTATION VISION

RAPID TRANSIT AND COMMUTER RAIL

EXHIBIT 2.6 A

The system would be extended by providing express and local bus services on HOV/transit priority lanes east-west in Halton region along Highway 5, linking to the Highway 403 busway in Peel, north-south on Highway 11 linking the Yonge Street subway extension to Highway 407 and northward to Newmarket, east-west in south York region along Highway 7 augmenting inter-regional express bus services in the Highway 407 corridor, north-south on Highway 10 in Peel, and east-west between the Scarborough City Centre and Oshawa along Highway 2 east of the Metro boundary and Highway 401 west of the boundary.

A number of the links in this network are currently undergoing Environmental Assessment studies, while other links in the proposed network have not been considered in recent studies. The Working Group is strongly of the opinion that, in the interests of creating a long range rapid transit network with continuous lines and appropriate intersection points which will both serve and help shape the Nodal concept, the additional rapid transit links should be included in the vision and steps should be taken to protect for eventual implementation of such links. Such long range thinking is essential in order to achieve a rational network and to provide an appropriate framework for shorter term implementation decisions. More detailed studies will, of course, be necessary to establish the most appropriate technologies, interchange points and priorities for cost-effective implementation of the rapid transit part of the transportation vision, as summarized below in Section 2.6.4.

As shown earlier in Exhibit 2.2 (B), the Working Group took as given that current plans include providing full service on all seven existing commuter rail lines. As shown in Exhibit 2.6 (A) the Working Group proposes, in addition, that protection be provided for seven extensions or new links:

- service on the MacTier subdivision of CP Rail to Bolton;
- service on the Havelock subdivision of CP Rail to north Pickering;
- service on the Belleville subdivision of CP Rail to central Pickering and possibly a connection to the York subdivision of CN Rail crossing the east Metro boundary;
- service along the CP Rail North Toronto subdivision (in the corridor just north of Dupont Street) serving the mid-town area of Metro Toronto and linking the junction of the Milton, Georgetown and Bradford lines in the west to the Richmond Hill and Stouffville lines in the east and possibly using the more direct CP link through Leaside for Richmond Hill service rather than the CN line through the Don Valley (which is now used) in order to provide easier connections to east-west roads and transit routes and a more effective alignment to the Central Area;
- construction of a connection between the CP Galt subdivision east of Hornby and the CN York subdivision in the vicinity of the Halwest junction, thereby allowing CP mainline freight to bypass the North Toronto subdivision by using the CN York subdivision and so freeing the North Toronto subdivision to carry commuter rail service;
- a spur connection from the Georgetown line to Pearson International Airport; and

- service on the Orangeville subdivision of CP Rail from Orangeville to Brampton.

The Working Group recognizes that a number of these connections involve existing mainline track and it will be necessary to carry out a rail rationalization study in close cooperation with the two railways as a basis for such possible extensions and to establish required actions to ensure that these options are protected.

2.5.3 HIGHWAY NETWORK AND UTILITY CORRIDORS

This part of the vision is illustrated in Exhibit 2.6 (B).

As shown earlier in Exhibit 2.2 (A) the Working Group took as given that the planned system includes completion of Highway 403 across Halton region, completion of Highway 407 along the Halton/Peel boundary, eastward across Peel and York regions, and then eastward across Durham region, linking to Highway 115/35 beyond the GTA's east boundary. Also included in the planned network (Exhibit 2.2 [A]) are north-south connections in the vicinity of Regional Road 23 and Regional Road 34, respectively, between Highway 401 and the eastern extension of Highway 407 in Durham region.

The new links proposed for protection and possible future implementation are an east-west utility corridor in central York region, with north-south connections between that corridor and Highway 407 in the vicinity of the Peel/York boundary on the west (an extension of Highway 427) and the York/Durham boundary on the east. The Working Group feels that the option of such an east-west corridor should be protected in the context of a 30 or 40 year planning horizon in order to help provide for the continuity and integrity of the provincial highway network and the rail and energy distribution networks to serve both east-west and north-south movements in and through York region. This would be a multi-modal utility corridor which might include an east-west rail freight by-pass line, gas and/or electric energy lines and/or a possible east-west highway.

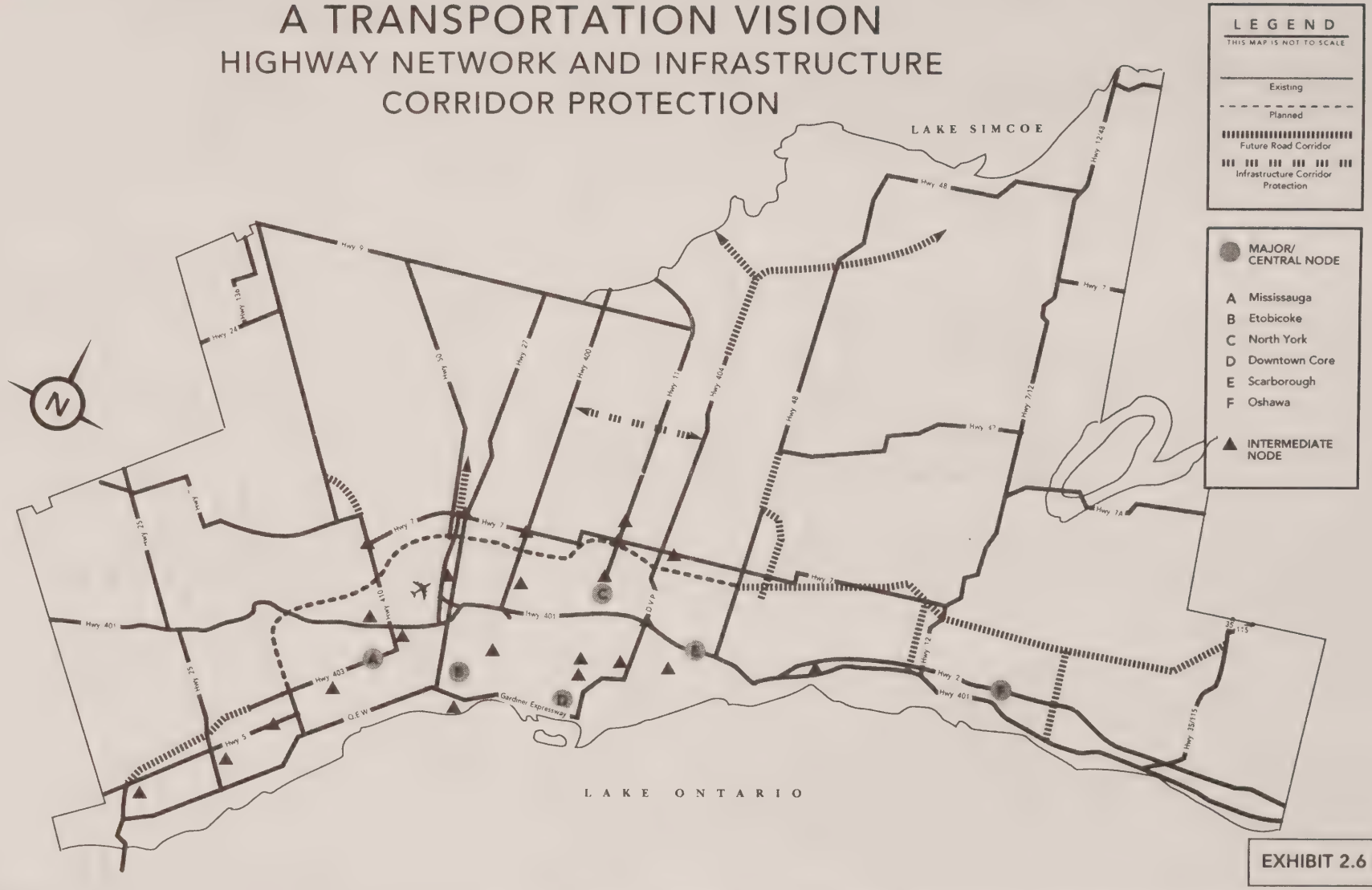
Again, more detailed studies of locations, functions, interchange points and environmental impacts will be required as a basis for implementation decisions.

2.5.4 SYSTEM INTEGRATION

While it is not feasible in a report such as this to show the entire transportation vision on one map, it is essential that it be planned, designed, implemented and operated as an integrated whole, as noted earlier. This means that GO stations, rapid transit stops and major interchange points in the transit and commuter rail network should be located within major and intermediate nodes to the extent possible, and/or the nodes should provide intensified, mixed uses at existing or relocated GO stations, such that access by walking, bicycle and local transit is convenient and safe. It also means that provincial highways and municipal arterial roads should be designed and operated to move **people** and **goods** rather than devoting prime emphasis to the private automobile, through measures such as HOV/transit priority lanes, transit signal priority, park-and-ride facilities, and related actions. Arterial and collector roads, and related urban design - particularly **within** the nodes but also **between** them - should be planned and delivered such that the resulting streetscapes are pedestrian- and transit-friendly, with appropriate provision for cyclists in designated shoulder lanes or on separate bicycle ways. As described more fully in the ***Transit-Supportive Land Use Planning Guidelines*** soon to be published by the Province, compact, mixed-use urban structure is essential in the various nodes and along development corridors, with higher

A TRANSPORTATION VISION

HIGHWAY NETWORK AND INFRASTRUCTURE CORRIDOR PROTECTION



LEGEND

THIS MAP IS NOT TO SCALE

- Existing
- Planned
- Future Road Corridor
- Infrastructure Corridor Protection

MAJOR/ CENTRAL NODE

- A Mississauga
- B Etobicoke
- C North York
- D Downtown Core
- E Scarborough
- F Oshawa

▲ INTERMEDIATE NODE

EXHIBIT 2.6 B

density on transit routes and lower density in areas not so well served by transit. The principle of network continuity, as stressed earlier for the rapid transit system, applies equally or more strongly to the arterial road network and related collector roads, such that transit routes can provide appropriate service coverage and continuity within and between nodes.

Appropriate policy and institutional changes will also require consideration, to help ensure that the transportation system is, indeed, planned, delivered, operated and priced on an integrated basis. Some important initiatives of this type considered by the Working Group are discussed in the next section.

2.5.5 LONGER TERM POLICY/INSTITUTIONAL INITIATIVES

The ***Urban Structure Concepts Study*** and a number of other reports have documented the growing challenge of planning, delivering and operating an integrated transportation system in a manner which is closely integrated with urban structure and land use/urban design objectives, in a metropolitan region with 35 area municipalities, five regional municipalities and many provincial ministries, all with legitimate interests and objectives. One of the great strengths of the Metropolitan Toronto initiative in the mid 1950s was that it created a single government to plan and deliver urban development and related transportation, water/sewer and other important infrastructure and urban services. When major population growth started to spill over the Metro boundaries in the 1970s, this unified approach was lost; the various governments are striving to replace it with a coordinated approach through agencies such as the GTCC and coordinated actions of the provincial and municipal governments.

In the context of GTA transportation, there are three major challenges which have to be addressed by means of policy/institutional initiatives beyond those currently in place:

1. Planning and delivery of urban development (land use) and transportation infrastructure on an integrated basis;

2. Integrated planning, delivery, and operation of the multi-modal transportation system; and

3. Sufficient funding to construct, operate and maintain the transportation infrastructure and associated vehicles, terminals and control systems.

Each of these is discussed briefly below.

Integrated Planning/Delivery of Land Use and Transportation

The most direct way to achieve integrated planning and delivery of urban development, transportation and other major infrastructure is to have unified government control such as was achieved by Metro Toronto and applied so successfully during its first 15-20 years of rapid population growth. In the absence of such a government structure, the next best approach appears to be a committee structure such as the GTCC, supported by the OGTA, other provincial ministries and the municipalities in order to achieve a common vision as a basis for coordinated planning and delivery. The current GTA visioning exercise, including the reports of the six Working Groups and subsequent public consultations, holds the promise of achieving the desired integration, but this will require continuous and dedicated effort.

By its very nature, achieving an urban structure (e.g. the Nodal concept) and urban design which are more sustainable in terms of land consumption, energy use and environmental quality, and more conducive to greater use of transit, walking and cycling, is a long term initiative. Implementing the Nodal land use concept will require a sustained and coordinated effort over several decades. It is therefore essential that the intergovernmental coordinating mechanisms and approaches be carefully thought through and agreed to by the relevant governments/agencies; otherwise, the required sustained effort may not be forthcoming and past trends are again likely to predominate. In the meantime, it is necessary to start immediately to implement the Nodal land use concept and related infrastructure initiatives, so that precious time will not be lost in achieving the vision.

Integrated Transportation/Transit

Integrated planning, delivery and operation of the entire transportation system, including both roads and transit, will also require continuing dedicated effort under the above umbrella approach, since it seems unlikely that a single transportation agency responsible for all modes is a viable alternative under the current government structure.

Within the transit mode, however, there are a number of possible institutional structures. These have been defined and assessed in several studies during the past 10 or 15 years. Emerging from the studies, the concept of a federated approach or transit union has tended to receive considerable support. Under this approach, each transit agency would continue to provide services in its franchised area but they would also form a federation or union in order to achieve a more coordinated approach to planning and delivering services, including fare integration and service coordination. There are a number of successful examples in European Metropolitan areas such as Frankfurt, Hamburg and Paris.

The importance of achieving an integrated transportation system is such that the Working Group urges the governments involved to pursue the transit union approach and to devote the necessary efforts to coordinated system planning, implementation of new facilities, fare integration and service coordination.

Transportation Financing

A combination of massive accumulated debts, continuing deficits and large expenditures on human services by governments at all levels is making it increasingly difficult to find funding for transportation system maintenance and rehabilitation, much less system expansion.

Faced with this situation, there have been various initiatives aimed at involving the private sector (e.g. landowners and development companies) in capital funding for new rapid transit lines which would increase the value of their land holdings. A detailed study of such an approach, as it might be applied to the Sheppard Subway (carried out by Coopers & Lybrand and IBI Group on behalf of Metropolitan Toronto) identified and analyzed various ways of achieving this and concluded that, in practice and in a strong urban development market, as much as one third of the capital cost of the Sheppard Line might be financed through private sector sources in this way. The Working Group endorses initiatives of this type by the appropriate public and private sector participants.

The other major source of funding for transportation infrastructure/services is the system users. Typically, for transit services in the GTA, about one half to two thirds of the operating costs are

recovered from the fare box, leaving the remainder of the operating costs and all of the capital costs to be borne by the public sector.

It is worth noting that, during the six or seven decades prior to 1950 municipal transit was a profitable business, capable of making the required capital investments and providing a good return on such investments, particularly if the transit property also involved itself in urban development in the areas opened up by its transit lines, as was often the case. This situation rapidly changed following the discontinuing of war time gas rationing, and resulting from rapid growth in car ownership and extensive highway building programs in the 1950s and 1960s. It is possible, however, that policies to encourage transit use and reduce automobile dependence, implemented during the 1990s and beyond for environmental reasons and to conserve energy and land resources, may restore transit to a more profitable condition. In this regard, it is interesting to note that the Skytrain (ALRT) rapid transit system serving Greater Vancouver is very nearly able to carry its capital and operating costs from the fare box, reflecting its relatively low labour costs, high frequency of service, and resulting high ridership made possible by automated train operation.

In order to achieve a better balance between costs and revenues for transit construction and operation, substantial additional initiatives will be required, including the provision of expanded and more convenient transit services and appropriate incentives for travellers to use transit instead of auto for most or all discretionary trips. Direct pricing for those who use congested roads at congested periods would be the most direct and powerful incentive, consistent with our market economy, that has not yet been used for this purpose. There is growing worldwide interest in this approach, reflecting the fact that the technology is available (based on "smart chips" embedded in licence plates, inductance loops buried in roads, and computer-generated monthly billing by mail to drivers who use congested roads at congested times). Road pricing schemes already exist in several European and Asian cities, and electronic toll systems are being introduced in the United States both to provide facility funding and to moderate peak period traffic volumes on congested facilities. The pay-off for system users is that discretionary trips will tend to avoid peak periods/roads and/or use other modes such as transit, walking or cycling, and that funding becomes available to maintain and expand the transportation system such that an improved level of service is experienced by both transit and road users. In order to introduce such a system, provincial initiative would be required and it might be that a revenue-neutral approach would be taken such that fuel taxes would be reduced somewhat while direct road pricing would apply for those continuing to use congested roads: primarily or exclusively in urban areas. Major transit improvements, such as proposed in this report, would be required to provide an attractive alternative for peak period auto users.

Ultimately, and assuming that governments continue to suffer severe financial constraints, it will be necessary to finance new transportation infrastructure from the commercial bond market, based on an assured revenue stream from users of the system. Such revenues could come from special taxes such as the Commercial Concentration Tax and/or vehicle registration and fuel taxes, but road pricing would have the added force of increasing in direct proportion to automotive use while at the same time acting to moderate growth in that use and encourage the use of transit. It is possible that a "transportation utility corporation" might be established (similar to telephone and energy utilities) to implement and administer such a pricing scheme and, based on the dedicated revenues resulting from this, float bond issues to finance the construction and maintenance of major transportation facilities. There are obviously a number of important public policy and institutional issues to be addressed in considering such initiatives. They are, therefore, likely to be longer term rather than shorter term in nature. The Working Group felt, however, that it is

important to put such possible initiatives "on the table" at this time for consideration by the various governments and by the public at large, since initiatives of this type could have a profound effect on the quality of transportation, other community attributes, the environment and the economy in the Greater Toronto Area. Government control would be retained over transportation priorities and decisions, which would continue to be based on providing facilities and services which are cost-effective in terms of user volumes served relative to capital and operating costs, while helping to meet other community objectives.

2.6 PROPOSED TRANSPORTATION POLICIES AND PRIORITY ACTIONS

2.6.1 SHORT TERM ACTIONS

System Optimization Measures

Short term system optimization measures (for implementation during the next 5-10 years) given a high priority by the Working Group are listed in Exhibit 2.7. These can be summarized as follows:

- **Integrated Urban Development/Infrastructure**:

  - mechanism(s) for coordinated planning and delivery of urban development and transportation infrastructure/services need to be agreed among the 35 GTA municipal governments, and the provincial government and related agencies and put into effect on an early and ongoing basis;

  - the current process of defining the Nodal concept and related infrastructure vision for the GTA should be completed and subjected to public consultation as a basis for ongoing commitment to the concept/vision;

  - planning, zoning and infrastructure actions should be initiated as quickly as possible to begin achievement of the Nodal urban structure concept and related infrastructure.

- **Transit and Commuter Rail**:

  The following measures should receive high priority for implementation in the short term:

  - transit priority measures and HOV/transit priority lanes;

  - transit fare integration and service coordination;

  - pricing structure for transit and related parking;

  - employer tax break for subsidizing transit passes;

  - transit communications and control; and

  - commuter rail service/integration/coordination with the Nodal concept and other elements of the transportation system.

EXHIBIT 2.7: HIGH PRIORITY SHORT TERM SYSTEM OPTIMIZATION MEASURES
(IMPLEMENTED DURING NEXT FIVE-TEN YEARS)

INTEGRATED URBAN DEVELOPMENT/INFRASTRUCTURE

- MECHANISM(S) FOR COORDINATED PLANNING/DELIVERY
- COMMITMENT TO NODAL CONCEPT AND TRANSPORTATION VISION
- EARLY PLANNING, ZONING AND INFRASTRUCTURE ACTIONS TO THAT END

TRANSIT AND COMMUTER RAIL

- TRANSIT PRIORITY MEASURES AND HOV LANES
- TRANSIT FARE INTEGRATION AND SERVICE COORDINATION
- PRICING STRUCTURE FOR TRANSIT AND RELATED PARKING
- EMPLOYER TAX BREAK FOR SUBSIDIZING TRANSIT PASSES
- TRANSIT COMMUNICATION AND CONTROL
- COMMUTER RAIL ENHANCED SERVICE/INTEGRATION/COORDINATION

ROADS

- FREEWAY TRAFFIC MANAGEMENT SYSTEMS
- LESS ON-STREET PARKING AND LOADING
- INTERSECTION IMPROVEMENTS

- **Roads**:

  The following measures should have high priority to achieve more efficient use of the road network:

  - freeway traffic management systems;
  - less on-street parking and loading; and
  - intersection improvements.

System Expansion Elements

The **short term** transportation system expansion elements assigned high priority by the Working Group are listed in Exhibit 2.8. These elements, which should be implemented or on which construction should be initiated during the next 10 years, are as follows:

- **Transit and Commuter Rail**:

  - selected links in the rapid transit network vision, including rapid transit extensions of the Bloor and Yonge lines across the Metro boundary to the Mississauga and Langstaff nodes, respectively; introduction of HOV/transit priority lanes/express bus services as precursors to higher-order rapid transit service connecting the nodes and connecting the north ends of the Spadina RT and Scarborough RT to the Vaughan and Markham nodes, respectively; extensions of the Central Waterfront LRT service to the west and east as required to serve land use; and commencement of the Eglinton RT from the Spadina line to the west Metro boundary, the Sheppard RT from the Yonge line east to Victoria Park Avenue, and the Mississauga Transitway from the City Centre west to Winston Churchill Boulevard;
  - all-day service on six of the seven existing GO rail lines, (provided by a single shuttle train on each line providing approximately hourly service depending on the length of the line, plus more frequent peak period peak direction service) and upgrading to full service on parts of selected lines;
  - introduction of GO Rail service on the CP Rail North Toronto subdivision;
  - relocation of some GO stations and creation of new stations integrated with the Nodal land use concept (e.g. located within the more compact parts of the nodes where possible) and also integrated with the rest of the transportation/transit system in terms of interchange points/facilities, schedules and integrated pricing;
  - frequent shuttle transit service between Nodal centres and nearby GO stations, for example between the Mississauga City Centre and the Cooksville station on the Milton GO line;
  - higher-order transit service to Pearson International Airport and the adjacent areas; and

EXHIBIT 2.8: HIGH PRIORITY SHORT TERM SYSTEM EXPANSION ELEMENTS

(IMPLEMENTED OR CONSTRUCTION INITIATED DURING NEXT TEN YEARS)

TRANSIT AND COMMUTER RAIL

- SELECTED LINKS IN THE RAPID TRANSIT VISION NETWORK:

  E.G. RT EXTENSIONS OF THE BLOOR AND YONGE LINES CONNECTING TO MISSISSAUGA AND RICHMOND HILL NODES, RESPECTIVELY; HOV/TRANSIT PRIORITY LANES EXPRESS BUS AS PRECURSORS OF HIGHER ORDER SERVICE CONNECTING THE NODES; EXTENSIONS OF CENTRAL WATERFRONT LRT SERVICE TO THE WEST AND EAST, AS REQUIRED TO SERVE WATERFRONT LAND USE; COMMENCEMENT OF EGLINTON LINE WEST OF SPADINA LINE, SHEPPARD LINE EAST OF YONGE LINE, AND MISSISSAUGA TRANSITWAY WEST OF CITY CENTRE
- ALL DAY SERVICE ON SIX OF THE SEVEN EXISTING GO RAIL LINES AND FULL SERVICE ON PARTS OF SELECTED LINES
- NORTH TORONTO SUBDIVISION GO SERVICE
- RELOCATION/CREATION OF NEW GO STATIONS INTEGRATED WITH THE NODAL LAND USE CONCEPT AND WITH REST OF THE TRANSPORTATION/TRANSIT SYSTEM
- HIGHER ORDER TRANSIT TO PEARSON AIRPORT AREA
- CORRIDOR PROTECTION FOR ALL LINKS IN THE TRANSPORTATION VISION

HIGHWAYS

- HWY. 407 FROM HWY. 404 TO HWY. 10
- HWY. 401 WIDENING FROM NEILSON ROAD TO BROCK ROAD
- HWY. 401 WIDENING FROM HWY. 410 TO HWY. 25
- HWY. 404 WIDENING FROM 401 TO MAJOR MACKENZIE DRIVE
- HWY. 403 EXTENSION THROUGH HALTON REGION
- HIGHWAYS AND ARTERIALS DESIGNED/IMPROVED FOR INCREASED TRANSIT/HOV USE
- ARTERIAL NETWORK WIDENED/EXTENDED TO SERVE LAND USES AND MULTI-MODE FUNCTIONS
- CORRIDOR PROTECTION FOR ALL LINKS IN THE TRANSPORTATION VISION

- corridor protection for all links in the transportation vision.

- **Roads:**

  Construction of the following should be initiated and, if possible, completed during the next 10 years.

  - Highway 407 from Airport Road to Highway 10 and from Dufferin Street to Highway 404;

  - during design/construction of Highway 407, protection of future transit connections through highway interchanges, for example the interchange of Highways 400 and 407;

  - Highway 401 widening from Neilson Road to Brock Road and from Highway 410 to Trafalgar Road;

  - Highway 404 widening from Highway 401 to Major MacKenzie Drive;

  - Highway 403 extension through Halton region;

  - design and improvement of highways and arterials for increased transit/HOV use including completion of missing arterial road links where feasible and necessary for HOV network continuity;

  - widening/extension of the arterial road network to serve land uses and multi-modal functions including transit, trucks, bicycles and pedestrians as well as automobiles; and

  - corridor protection for all links in the transportation vision.

2.6.2 LONGER TERM ACTIONS

System Optimization Measures

Longer term system optimization measures given high priority by the Working Group are summarized in Exhibit 2.9, as follows:

- **Integrated Urban Development/Infrastructure:**

  - this requires sustained, ongoing commitment by the relevant municipal governments, the provincial government and affected agencies to the adopted mechanisms for integrated planning/delivery of the Nodal concept and related infrastructure.

- **Integrated Transportation/Transit System:**

  - as above, a sustained, ongoing commitment to the adopted mechanism(s) for coordinated planning and delivery of roads and transit; and

EXHIBIT 2.9: HIGH PRIORITY LONG TERM SYSTEM OPTIMIZATION MEASURES (IMPLEMENTABLE DURING NEXT TEN-TWENTY YEARS AND BEYOND)

INTEGRATED URBAN DEVELOPMENT/INFRASTRUCTURE

- SUSTAINED, ONGOING COMMITMENT TO INTEGRATED PLANNING/DELIVERY APPROACH AND DECISIONS

INTEGRATED TRANSPORTATION/TRANSIT SYSTEM

- AS ABOVE FOR COORDINATED PLANNING/DELIVERY OF ROADS AND TRANSIT
- MECHANISM FOR MORE INTEGRATED PLANNING, DELIVERY AND OPERATION/PRICING OF GTA TRANSIT SERVICES

TRANSPORTATION FINANCING

- BENEFIT SHARING: MIXED GOVERNMENT/LAND OWNER FINANCING OF TRANSPORTATION FACILITIES
- EXISTING USER PAY: INCREASED DEDICATION OF USER CHARGES FOR SYSTEM FUNDING
- EXTENDED USER PAY: INTRODUCTION OF CONGESTION PRICING FOR ROADS USE
- COMMERCIAL FINANCING: USE OF DEDICATED REVENUE STREAMS FOR COMMERCIAL BOND FINANCING OF TRANSPORTATION FACILITIES
- PRIVATE SECTOR INVOLVEMENT: GREATER INVOLVEMENT OF PRIVATE SECTOR FOR MORE EFFICIENT DELIVERY OF SERVICES
- FISCAL POLICY: DESIGN/MODIFICATION OF TAXES AND SUBSIDIES TO ENCOURAGE ACHIEVEMENT OF THE VISION

- implementation of a mechanism involving transit properties in the GTA to help achieve more integrated planning, delivery and operation/pricing of transit services.

- **Transportation Financing:**

  Some or all of the following financing approaches should be considered:

  - mixed government/landowner partnerships for financing of rapid transit lines, building on the types of approach currently being studied for the Sheppard line;

  - increase dedication of user charges for transportation system funding, including sources such as the Commercial Concentration Tax, vehicle registration and fuel tax, part or all of which should be dedicated to transportation system expansion, maintenance and rehabilitation purposes;

  - introduction of direct pricing for the use of roads which are congested, based on concepts discussed earlier in Section 2.5.5, in conjunction with substantial transit improvements to provide a viable alternative to auto trips, particularly in those areas and corridors most affected by congestion pricing for road use;

  - use of the dedicated revenue streams from sources such as the above for commercial bond funding of transportation system expansion, rehabilitation and maintenance, probably creating a utility corporation for this purpose;

  - design or modification of taxes and subsidies affecting transportation to encourage rather than hindering achievement of the vision; and

  - greater involvement of the private sector, where feasible, for more efficient delivery of services.

System Expansion Elements

Longer term system expansion elements given high priority by the Working Group are summarized in Exhibit 2.10. Construction of the following system expansion elements should be initiated as soon as possible following the year 2001:

- **Transit and Commuter Rail:**

  - remaining links in the rapid transit vision network (over and above those listed in Exhibit 2.8), including extensions of the Spadina and Scarborough RT lines to Vaughan and Markham, respectively; completion of the two east-west lines (in the Eglinton and Sheppard corridors) in the northern half of Metro Toronto and linking at Eglinton and Renforth Avenue to the Mississauga Transitway which would also be completed; the circumferential line in the Highway 7/407 corridor across south York region, through Brampton and down Highway 10 through the Mississauga City Centre to the QEW; enhancement of the Central Waterfront LRT system; and a north-south rapid transit connection from the Bloor subway north to Eglinton and Renforth, from there serving Pearson Airport and area, and from there connecting northward to Highway 407;

EXHIBIT 2.10: HIGH PRIORITY LONG TERM SYSTEM EXPANSION ELEMENTS
(CONSTRUCTION INITIATED FOLLOWING NEXT TEN YEARS)

TRANSIT AND COMMUTER RAIL

- REMAINING LINKS IN RAPID TRANSIT VISION NETWORK
- SELECTIVE UPGRADING OF HOV SERVICES TO FULL RAPID TRANSIT
- CONTINUING UPGRADING OF COMMUTER RAIL SERVICE FREQUENCIES AND POSSIBLE ELECTRIFICATION IF ECONOMICALLY JUSTIFIED
- SELECTIVE COMMUTER RAIL SERVICE ON PROTECTED LINKS
- CONTINUING EMPHASIS ON INTEGRATED LAND USE/TRANSPORTATION

ROADS

- COMPLETION OF HWY. 407 FROM HWY. 403 TO HWY. 115/35
- COMPLETION OF NORTH-SOUTH LINKS CONNECTING HWYS. 401 AND 407 IN DURHAM
- HWY. 410 EXTENSION TO SNELGROVE
- POSSIBLE INITIATION OF EAST-WEST UTILITY CORRIDOR IN CENTRAL YORK REGION AND NORTH-SOUTH CONNECTIONS IN HWY. 427 AND 48 CORRIDORS
- HIGHWAYS/ARTERIALS DESIGNED/IMPROVED FOR INCREASED TRANSIT/HOV USE
- ARTERIAL NETWORK EXPANDED TO SERVE LAND USE AND MULTI-MODE FUNCTIONS

SYSTEM PLANNING AND CORRIDOR PROTECTION

- EARLY INITIATION OF STUDIES/ACTIONS TO DEFINE THE SYSTEM AND PROTECT CORRIDORS

- selective upgrading of the HOV/transit priority lanes/bus services on part or all of the sections of Highways 2, 5, 7 and 11 referenced in the rapid transit vision network;

- commuter rail service introduced as appropriate on some or all of the links which were protected for such a possibility, including the North Toronto subdivision, the spur link to Pearson International Airport, and the MacTier, Belleville, Orangeville and Havelock subdivisions; continuing increases in service frequency, possibly combined with electrification on some lines if economically justified; and

- continuing emphasis on integrated land use/transportation planning and delivery to ensure that the transportation system continues to serve and help shape the Nodal concept.

• **Roads:**

The remainder of the planned highway network improvements and possible extensions should be implemented, as follows:

- full completion of Highway 407 from Highway 403 to Highway 115/35;

- completion of the two limited access north-south links connecting Highways 401 and 407 in Durham;

- possible initiation of an east-west utility corridor in central York region and north-south connections between this corridor and Highway 407 (as a Highway 427 extension) on the west and to Highway 407 in the vicinity of the York/Durham boundary/Highway 48 in the east; early protection of this corridor, particularly where it is threatened by continuing development in the Yonge Street corridor;

- extension of Highway 410 north to Snelgrove;

- a continued practice of designing and improving highways and arterial roads for increased transit/HOV use;

- continuing expansion of the arterial road network to serve land use development in accordance with the Nodal concept and improvements to serve multi-modal functions including transit, trucks, pedestrians and cyclists as well as automobiles; and

- early initiation of studies and actions to define the transportation system and protect all relevant corridors.

2.6.3 COST IMPLICATIONS

Broad estimates of capital budgets required to implement the proposed system expansion elements are as follows:

	Capital Cost (1991 $billions)
RAPID TRANSIT (Conceptual):	
Sheppard Line - initially from the Yonge line east to Victoria Park Avenue, then (in the longer term) west from Yonge Street to the Pearson airport and adjacent area, east from Victoria Park to Scarborough City Centre	**$1.0 + $4.0**
Eglinton Line- initially west from the Spadina line to Mississauga Transitway, then east to the Danforth subway at Kennedy Ave.	**$1.0 + $2.5**
Mississauga Transitway - initially west of the Mississauga City Centre, then east to the Eglinton RT line at the Metro boundary	**$0.2 + $0.3**
Yonge Extension - initially buses on HOV/transit priority lanes, then RT extensions from Finch to Hwy 407, all in the short term	**$0.5**
Bloor Extension - initially buses on HOV/transit priority lanes, then RT extension from Kipling Ave. to Mississauga City Centre, all in the short term	**$1.3**
Spadina Extension - initially buses on HOV/transit priority lanes, then RT - from Sheppard and Wilson to Vaughan/Hwy 407	**$0.1 + $0.9**
Scarborough RT Extension - initially buses on HOV/transit priority lanes, then RT extension from the Scarborough City Centre to the Markham node/Highway 407 recognizing early staged implementation of the SRT extension to Markham Road and Sheppard Avenue is possible	**$0.1 + $1.9**
Harbourfront LRT Extensions - as in Let's Move Initiative (west to Park Lawn Road and east to Greenwood) and subsequently enhanced (LRT loop in tunnel under Queen Street, south on Strachan and Cherry Streets and at grade along Queen's Quay)	**$0.3 + 0.7**
Spadina LRT - south from Bloor Street to Queen's Quay	**$0.1**
Highway 7 & 10 High-Order Bus Service - initially buses on HOV/transit priority lanes, then busway - connecting nodes in York and Peel regions to each other and south on Highway 10 to Lake Shore Road	**$0.3 + $1.2**
Hwy 5 High-Order Bus Service (Halton) - initially buses on HOV/transit priority lanes, then busway - from Mississauga Transitway south on Hwy 403 to Hwy 5 and across Hwy 5 to Hwy 25	**$0.1 + $0.3**
Hwy 2 High-Order Bus Service (Durham) - initially buses on HOV/transit priority lanes, then busway - from Scarborough City Centre along Hwy 401 to Hwy 2, across Hwy 2 to Oshawa	**$0.2 + $0.7**

	Capital Cost (1991 $billions)
Yonge Street High-Order Bus Service (York) - initially buses on HOV/transit priority lanes, then busway - from Hwy 407 to Newmarket	**$0.1 + $0.5**
Airport Transitway - initially buses on HOV/transit priority lanes, then busway - linking first from Eglinton/Renforth to airport and later south to Bloor line and north to Hwy 407	**$0.2 + $0.6**
COMMUTER RAIL (Conceptual):	
Stouffville line - all-day service, then expanded to full service to Markham and peak period service to Goodwood	**$0.05 + 0.4**
Georgetown line - all-day service, then full service to Brampton	**$0.05 + 0.2**
Richmond Hill line - all-day service, then full service to Richmond Hill and peak period service to Bloomington Road	**$0.2 + 0.5**
Milton line - all-day service, then full service to Winston Churchill Boulevard	**$0.1 + 0.5**
Whitby to Oshawa Extension - all-day service to downtown Oshawa, then full service and extension to Harmony Road	**$0.05 + 0.1**
Oakville to Port Credit - extra track allowing all-day half hour headway service and improved peak period frequencies	**$0.1**
North Toronto Subdivision - all-day service, then full service	**$0.2 + 0.3**
Bradford Line - enhanced peak period service, then all-day service to Vaughan	**$0.05 + 0.4**
Other Protected Lines - all-day service on MacTier, Havelock and Belleville subs	**$1.0**
HIGHWAYS AND UTILITY CORRIDORS (Conceptual):	
Hwy 401 widening - Neilson Road to Brock Road	**$0.2**
Hwy 401 widening - Hwy 410 to Hwy 25	**$0.2**
Hwy 404 widening - Hwy 401 to Major MacKenzie Drive	**$0.1**
Hwy 407 construction - Hwy 10 to Hwy 404	**$0.8**
Hwy 407 construction - Hwy 10 to Hwy 403 **Hwy 407 construction** - Hwy 404 to Hwy 115/35 **Hwy 401/407 N-S links** in Durham region	**$0.8**

	Capital Cost (1991 $billions)
Hwy 403 extension - through Halton region	**$0.3**
Hwy 427 extension - to east-west utility corridor	**$0.1**
Hwy 48 upgrading - to east-west utility corridor	**$0.1**
Hwy 404 extension north and east - with possible connection to Hwy 89	**$0.2**

These estimates have been sorted into short term and longer term priorities, as summarized in Exhibits 2.7 - 2.10, and the results are summarized in Exhibit 2.11. As indicated, the short term capital requirements are estimated to be about $5.8 billion for rapid transit, $0.8 billion for commuter rail and $4.6 billion for highways and regional roads, for a total short term system expansion cost of about $11.2 billion. The longer term system expansion requirements are estimated to be about $13.6 billion for rapid transit, $3.4 billion for commuter rail and $6.4 billion for highways and regional roads, for a longer term system expansion total of about $23.4 billion. These estimates are all in constant 1991 dollars.

The total estimated system expansion costs, about $34.6 billion, is not inconsistent with the estimates provided in the ***Urban Structure Concepts Study***, bearing in mind that the latter were provided about two years ago, were in 1990 dollars, and were known to understate transportation capacity requirements. If it is assumed that the vision would be achieved in the next 30 years, it can be seen that annual capital investments exceeding $1 billion per year will be required to achieve the transportation vision. This level of continuing investment suggests strongly that streams of user revenues will have to be more directly dedicated to transportation system financing and it may also be necessary to develop private sector/public sector joint financing approaches for major facilities, such as rapid transit lines, which add value to adjacent land holdings and real estate.

It is more difficult to estimate capital cost requirements for implementing transportation management measures. Some of these (e.g. HOV/transit priority lanes on provincial highways) are included in the above system expansion totals, but there are other significant cost elements in the proposed program of transportation management measures, including HOV networks in other built-up areas (e.g. Metro Toronto), transit communications/control and freeway traffic management/area traffic control systems, retrofitting of buildings/facilities to reduce on-street parking and loading, and intersection improvements. It is likely that these would add an additional $1-2 billion to the required capital budget for transportation system improvements to achieve the vision.

2.6.4 FURTHER WORK

As indicated at various points throughout the report, the Working Group's findings and proposals are, of necessity, conceptual at this stage. More detailed planning, analyses, impact assessment and design work will be necessary to provide further definition and implementation plans/ designs/programs for the various system optimization measures and system expansion elements.

EXHIBIT 2.11: BROAD COST ESTIMATES FOR SYSTEM EXPANSION ELEMENTS (1991 $BILLIONS)
(KEYED TO TRANSPORTATION VISION, EXHIBIT 2.6 AND SYSTEM EXPANSION ELEMENTS
LISTED IN EXHIBITS 2.8 AND 2.10 FOR SHORT AND LONG TERM, RESPECTIVELY)

	SHORT TERM (Initiated Next 10 Years)		LONGER TERM (Initiated After Next 10 Years)	
RAPID TRANSIT				
• Radial Extensions	To Langstaff & Mississauga Nodes:	$ 2.0	To Markham & Vaughan Nodes:	$ 2.8
• Bus: Hwy. 2, 5/403, 7/407, 10, 11 Corridors and from existing radial RT lines to Markham and Vaughan Nodes	HOV Services:	0.9	Busways:	2.7
• Sheppard Corridor	East from Yonge to Victoria Park:	1.0	Completion to Pearson Airport/Eglinton line and to Scarborough City Centre:	4.0
• Eglinton Corridor	West of Spadina:	1.0	East of Spadina:	2.5
• Mississauga Transitway	West of City Centre:	0.2	East of City Centre:	0.3
• LRT: Harbourfront & Spadina	As in Let's Move:	0.5	Extended/Enhanced:	0.7
• Pearson Airport Connections	Renforth to Airport:	0.2	Extended North & South:	0.6
TOTAL		$ 5.8		$13.6
COMMUTER RAIL				
• Full Service on 7 Lines	Enhanced (All-Day) Service:	$ 0.6	Full Service:	$ 2.1
• Service on North Toronto Sub	Initial (Peak) Service:	0.2	Full Service:	0.3
• Service on Other Protected Lines			Full Service:	1.0
TOTAL		$ 0.8		$ 3.4
HIGHWAYS AND REGIONAL ROADS				
• Hwy 401 Widening	As Programmed:	$ 0.4	Remainder Plus N-S Connections in Durham:	$ 0.8
• Hwy 407	Initial Sections:	0.8	Extension to North & East:	0.2
• Hwy 404	Widening in South:	0.1		
• Hwy 403	Extension Across Halton:	0.3		
• Hwy 427 Extension and Hwy 48 upgrading, to Utility Corridor, and Hwy 410 Extension to Snelgrove				0.2
• Hwy 404 extension north and east				0.2
• Arterial Road Network Expansion	Next 10 Years:	3.0	Following 20 Years:	5.0
TOTAL		$ 4.6		$ 6.4
TRANSPORTATION TOTALS		$ 11.2		$23.4
			TOTAL	$34.6

COSTS DO NOT INCLUDE ROLLING STOCK OR LAND ACQUISITION

In summary, further work will be required in the following areas:

- **Short Term System Optimization Measures:**
  - integrated urban development/infrastructure planning and delivery approaches;
  - transit and commuter rail optimization;
  - road system optimization.
- **Short Term System Expansion Elements:**
  - transit and commuter rail system expansion elements;
  - road system expansion elements.
- **Long Term System Optimization Measures:**
  - integrated urban development/infrastructure mechanisms;
  - integrated transportation/transit system mechanisms;
  - dedicated transportation system funding mechanisms.
- **Long term system expansion elements:**
  - transit and commuter rail system expansion elements;
  - rationalization of the overall rail network, including freight options, in and around the GTA, to achieve optimum use of the network for freight, commuter rail and intercity rail purposes, including high-speed rail service;
  - road system expansion elements.

The elements to be included in these ongoing studies and planning/impact/design projects will be as listed in Exhibits 2.7 through 2.10 and as described earlier. A critically important output of this work will be an agreed prioritization of the initiatives.

* * *

The Transportation Subcommittee of the Infrastructure Working Group offers the above findings and recommendations as a basis for achieving the transportation vision described in this report in conjunction with the Nodal land use development concept and related objectives as described in the recently released Working Document ***GTA 2021 - the Challenge of our Future.***

GTA 2021
INFRASTRUCTURE REQUIREMENTS

PART 3: WATER AND SEWER SYSTEMS

INFRASTRUCTURE WORKING GROUP
SERVICES SUBCOMMITTEE

MARCH, 1992

3.1 EXISTING FACILITIES AND DEFICIENCIES

3.1.1 INVENTORY OF EXISTING FACILITIES

This section of the report describes the existing water supply and sanitary sewerage systems in the GTA. The main features of the systems are illustrated in Exhibits 3.1(A) and 3.1(B).

Exhibit 3.1(A) shows the main features of the existing trunk water supply and distribution systems including the location of water supply plants, reservoirs, trunk watermains and well-based systems. Exhibit 3.1(B) shows the main features of the existing trunk sanitary sewerage systems including the location of water pollution control plants and trunk sewers. Planned expansions of the existing trunk systems are also indicated in these two exhibits.

Region of Halton

The Regional Municipality of Halton was created on January 1, 1974. Halton is comprised of four area municipalities: the City of Burlington and the Towns of Oakville, Milton and Halton Hills. The water and wastewater systems servicing these area municipalities constitute lake-based systems in Oakville and Burlington and stream-based systems in Milton and Halton Hills.

The overall system consists of seven water pollution control plants, four water supply plants, 20 groundwater wells, together with associated trunk sanitary sewers, trunk water mains, pumping stations and reservoirs. The present service population is approximately 300,000 with projected growth to just under 500,000 in the next 20 years.

The systems are owned and operated by the Regional Municipality of Halton. The 1991 operating budget was approximately $28 million. The 10-year capital forecast ranges from $28 million to $84 million per year for the construction of expanded and/or new facilities. A total complement of approximately 137 people is required to operate and maintain the systems.

Town of Oakville

Oakville has one water supply plant rated at approximately 24 million imperial gallons per day (migd - one imperial gallon is equivalent to 4.546 litres). This plant provides water supply to the Oakville urban area with the exception of a small area west of Bronte Creek.

Water is pumped from the plant through a series of large diameter trunk watermains to three reservoirs and two booster stations. Due to the change in elevation from the south to the north of Oakville, the transmission and supply system is divided into three separate pressure zones.

Oakville has three water pollution control plants. The Southwest Wastewater Treatment Plant has a rated capacity of 10.0 migd. This plant services the lands in the southwest quadrant of Oakville. The Southeast Wastewater Treatment Plant has a rated capacity of 7.0 migd. This plant services the lands in the southeast quadrant of Oakville. The Mid-Halton Wastewater Treatment Plant, located east of Highway 25 on the north side of the Queen Elizabeth Way, has a rated capacity of 4.5 migd. This plant services the land in the northeast and northwest quadrants of Oakville.

Each plant is fed through a combination of trunk sanitary sewers, pumping stations and forcemains.

EXISTING AND PLANNED SERVICING SYSTEM

WATER

EXHIBIT 3.1 A

EXISTING AND PLANNED SERVICING SYSTEM

SEWER

EXHIBIT 3.1 B

The wastewater treatment process used at all three plants is conventional activated sludge with chemical treatment for phosphorous removal. Sludge from all three plants is anaerobically digested and utilized as an agricultural fertilizer through Halton's sludge management program.

City of Burlington

Burlington has one water supply plant located west of Walker's Line on the north side of Lakeshore Road and rated at approximately 36 migd. This plant provides water supply to the Burlington urban area and to a small area of Oakville located west of Bronte Creek. Water is pumped from the plant through a series of large diameter trunk watermains to seven reservoirs and nine booster stations. Due to the change in elevation from the south of Burlington and the north of Burlington, the transmission and supply system is divided into six separate pressure zones.

Burlington has one water pollution control plant rated at approximately 20.0 migd. This plant treats the wastewater generated from the Burlington urban area. The plant is fed through a combination of trunk wastewater mains, pumping stations and forcemains.

The wastewater treatment process used is conventional activated sludge with chemical treatment for phosphorous removal. The sludge is utilized as an agricultural fertilizer through Halton's Sludge Management Program.

Town of Milton

The Town of Milton water supply system is presently comprised of five municipal wells with a permitted capacity of approximately 2.9 migd that services the urban area of Milton and the neighbouring hamlet of Milton Heights.

Milton has one water pollution control plant discharging to Sixteen Mile Creek. The plant has a rated capacity of approximately 2.84 migd and treats the wastewater generated from the Milton urban area.

The wastewater treatment process used is conventional activated sludge with nitrification, tertiary filtration and dechlorination. Sludge from the Milton Plant is anaerobically digested and utilized as an agricultural fertilizer through Halton's Sludge Management Program.

Town of Halton Hills

The Town of Halton Hills comprises the two separate urban areas of Acton and Georgetown.

The Acton water supply system is presently comprised of seven municipal wells with a permitted maximum day capacity of approximately of 1.1 migd that services the urban area of Acton.

Acton has one water pollution control plant discharging to Black Creek. The plant has a rated capacity of 1.0 migd and treats the wastewater from the Acton urban area. The wastewater treatment process used is conventional activated sludge, with chemical treatment for phosphorous removal, sedimentation and tertiary filtration in the summer months. Sludge from the Acton Plant is utilized as an agricultural fertilizer through Halton's Sludge Management Program.

The Georgetown water supply system is currently comprised of eight municipal wells with a permitted average day capacity of approximately 2.8 migd. The system services the urban area of Georgetown and portions of the neighbouring hamlets of Glen Williams, Stewarttown and Norval.

Georgetown has one water pollution control plant discharging to Silver Creek. The plant has a rated capacity of approximately 5.0 migd and treats the wastewater generated from the Georgetown urban area. The wastewater treatment process used is conventional activated sludge with nitrification and tertiary filtration. The effluent is disinfected using an ultraviolet light system. Sludge from the Georgetown Plant is used as an agricultural fertilizer.

Region of Peel

The Region of Peel comprises the Cities of Mississauga and Brampton, and the Town of Caledon.

The South Peel Water and Sewage System was conceived in the 1960's to provide service for the tremendous population growth that was to occur in the areas that now form Mississauga and Brampton. The South Peel agreement, signed in 1969 between the Ontario Government and the affected municipalities, marked the beginning of what has grown to be one of the largest systems in Canada. North Peel, comprising most of the Town of Caledon, is not serviced by the South Peel Water and Sewage System.

The South Peel system consists of two water pollution control plants and two water supply plants together with trunk sewers, feeder mains, pumping stations and reservoirs. The present service population is approximately 700,000 with projected growth to over one million in the next 20 years. Both the sewerage and water systems are in the top ten in size in Canada and they represent the largest of the Ontario Ministry of the Environment (MOE) systems.

It should be noted that the South Peel Sewage System was designed to service the entire drainage basin of the Region of Peel.

Although the systems are owned and operated by the MOE, the capital and operating budgets for the systems are supplied by the Region of Peel. At present, the yearly operating budget is approximately $23 million and the ongoing development of the system requires $25 million to $30 million per year for the construction of new facilities. A total complement of over 190 people is required to run and manage the system.

South Peel Water System

There are two water supply plants servicing the South Peel system: the Lakeview Plant which provides water to the east parts of Mississauga and Brampton; and the Lorne Park Plant which supplies water to west Mississauga. Together, the two plants can supply up to 150 migd. Lakeview can supply up to 100 migd and the Lorne Park Water Treatment Plant supplies up to 50 migd. The system has six pressure zones progressing northward from the lakefront to the City of Brampton.

The Lorne Park Plant is somewhat unique. To allow the public continued access to the site lands, the award winning plant was constructed entirely underground. The site is currently leased to the City of Mississauga which maintains and operates the land as Jack Darling Park.

South Peel Sewage System

Like the water system, the South Peel Sewage System is divided into east and west components, necessitated by the topography of the service area. The Lakeview Water Pollution Control Plant (WPCP), located on Lake Ontario, handles approximately two-thirds of the sewage flow from South Peel. The remainder is treated at the Clarkson WPCP in the southwest corner of Mississauga. Each plant is fed by a trunk sewer extending up to the City of Brampton. The two plants have a combined capacity of approximately 86 migd. Both plants operate as conventional activated sludge processes.

Sludge from the Clarkson Plant is either anaerobically digested and spread on agricultural fields or hauled to the Lakeview Plant for further treatment and disposal. The Lakeview facility uses thermal-conditioning and vacuum filter presses to produce a 45% to 50% cake which is disposed of on site in fluid bed incinerators. Wasted heat recovery boilers utilize the heat in the flue gases to produce all the steam required for thermal conditioning and surplus steam is used for plant heating needs. This closed energy loop saves the South Peel system in excess of $2 million a year.

Town Of Caledon

Most of Caledon is not serviced by the South Peel sewer and water systems. The Town is groundwater dependent for water and wastewater discharge. With the exception of the village of Bolton, all communities in the Town of Caledon rely on private septic tanks. A 3.2 km long force main links the village of Bolton to the Bolton/Brampton East Trunk Sewer and the Lakeview WPCP.

Communal wells provide the water supply for Bolton and the other communities in the Town of Caledon.

Region of Durham

Durham Region consists of eight area municipalities with 14 urban areas. The area municipalities comprise the City of Oshawa; the Towns of Ajax, Newcastle, Pickering and Whitby; and the Townships of Brock, Scugog and Uxbridge. The municipal sanitary sewage and water supply services for the urban areas are provided by seven mechanical sewage treatment plants, four sewage lagoon systems and associated sewage collection systems, and five lake-based water supply plants, six well supply systems and associated water distribution systems.

The existing sewage collection and water distribution systems are designed to have the capacity corresponding to the ultimate capacity of the sewage treatment and water supply plants in the respective systems. The following provides the general description of the inventory of existing sewerage and water supply systems.

Pickering/Ajax System

Sanitary sewage service for the Pickering/Ajax area is provided by the York/Durham Sewage System.

The York/Durham Sewage System consists of about 70 miles of pipe varying in diameter from two feet to ten feet and extending from Woodbridge in the west and Newmarket in the north to the Duffins Creek WPCP on Lake Ontario in the Town of Pickering. The history of the system dates back to the mid 1960's when the Ontario Water Resources Commission concluded that no further

up-stream sewage treatment plants would be permitted on the Humber, Don and Rouge Rivers and that a trunk sewer system should be provided together with treatment facilities on Lake Ontario east of Metropolitan Toronto.

Unlike the South Peel system, the York/Durham system was designed to serve a preselected design population rather than to service the entire sewershed.

The system was designed for an ultimate population of 416,000 people and 8,406 acres of industrial development in York Region, and an ultimate population of 424,080 people and 9,134 acres of industrial development in the Pickering/Ajax area including the proposed Seaton community and the proposed airport. Some $400 million has been invested in the system to date.

Water supply for the Pickering/Ajax area is provided by the Ajax Water Supply Plant and the transfer of water from the Whitby/Oshawa system via the interconnecting feedermain and the Harwood Pumping Station. The Ajax Water Supply Plant has a rated capacity of 12 migd and the Harwood Pumping Station has a rated capacity of 12 migd, for a total of capacity of 24 migd available for the Pickering/Ajax area.

Whitby/Oshawa/Newcastle (Courtice) System

The Town of Whitby, the City of Oshawa, and the Town of Newcastle (Courtice) are serviced by three interconnected sanitary sewage collection systems which discharge to the Pringle Creek and Corbett Creek Water Pollution Control Plants in Whitby and the Harmony Creek Water Pollution Control Plant in Oshawa.

The Pringle Creek WPCP has a rated capacity of 3.25 migd and provides treatment for sewage flows from part of the Town of Whitby. This plant is an activated sludge plant and its effluent is discharged to Pringle Creek. It will not be possible to expand the capacity of the plant due to the limited assimilative capacity of Pringle Creek. Ultimately, this plant is to be decommissioned and the sewage flows to be diverted to the Corbett Creek WPCP.

The Corbett Creek WPCP is an activated sludge plant with a rated capacity of 8.0 migd. It was designed to have an ultimate capacity of 26 migd. This plant provides treatment for sewage flows from the remaining part of the Town Of Whitby and from part of the City of Oshawa.

The Harmony Creek WPCP consists of two separate plants. Plant No. 1 is the original trickling filter biological treatment plant with a rated capacity of 7.5 migd, and Plant No. 2 is an activated sludge plant with a rated capacity of 7.5 migd, giving a total rated plant capacity of 15 migd. The plants provide treatment for sewage flows from the remaining part of the City of Oshawa and from the Town of Newcastle (Courtice).

Water supply for the Whitby/Oshawa/Newcastle (Courtice) urban area is provided by the Whitby Water Supply Plant (WSP) and the Oshawa WSP which have rated capacities of 24 migd and 27 migd respectively, for a combined system capacity of 51 migd.

Newcastle (Bowmanville) System

The Bowmanville urban area is serviced by a sanitary sewage collection system which discharges to the Port Darlington Water Pollution Control Plant. The Port Darlington WPCP was designed to have an ultimate capacity of 9.25 migd. The existing plant has a rated capacity of 1.0 migd and construction for expansion of the plant capacity to 3.0 migd is near completion.

Water supply for the Bowmanville urban area is provided from the Bowmanville Water Supply Plant on Lake Ontario and the Skinner's Spring located north of Bowmanville. The Bowmanville WSP has a rated capacity of 4.0 migd and the spring is capable of yielding 0.35 migd, which provides a combined water supply capacity of 4.35 migd.

Newcastle (Newcastle) System

The Newcastle urban area is serviced by a sewage collection system which discharges to the Graham Creek Water Pollution Control Plant.

The Graham Creek WPCP is a prefabricated extended aeration plant which has a rated capacity of 0.4 migd.

Water supply is provided from the Newcastle Water Supply Plant which has a rated capacity of 1.8 migd. The Newcastle WSP also provides water supply to the hamlet of Newtonville.

Newcastle (Orono) System

At present the existing development in the Newcastle (Orono) urban area is being serviced by private sewage disposal systems. Water supply for the Newcastle (Orono) urban area is provided from two wells with a rated capacity of 0.29 migd.

Scugog (Port Perry) System

The Port Perry urban area is serviced by a sanitary sewage collection system which discharges to the Nonquon River Water Pollution Control Plant. This WPCP consists of a 6-celled waste stabilization pond for the capacity of 0.7 migd based on 180 days retention.

Water supply for the Scugog (Port Perry) system is provided from three wells. The two main wells have a combined capacity of 2.02 migd. The third well has a capacity of 0.5 migd but is utilized only a on a stand-by basis.

Uxbridge (Uxbridge) System

The Uxbridge urban area is serviced by a sanitary sewage collection system which discharges to the Uxbridge Brook Water Pollution Control Plant. The Uxbridge Brook WPCP is a tertiary treatment plant using an extended aeration process with effluent filtration and has a rated capacity of 0.8 migd.

Water supply for the Uxbridge urban area is provided from three wells with a combined capacity of 1.69 migd.

Brock (Sunderland) System

The Sunderland urban area is serviced by a sanitary sewage collection system which discharges to the Beaverton River Water Pollution Control Plant No. 1. This plant consists of a 2-celled waste stabilization pond with a capacity of 0.16 migd based on 180 days retention.

Water supply for the Sunderland water distribution system is provided from two wells having a combined capacity of 0.47 migd.

Brock (Cannington) System

The Cannington urban area is serviced by a sanitary sewage collection system which discharges to the Beaverton River Water Pollution Control Plant No 2. This plant consists of a 2-celled waste stabilization pond with a capacity of 0.23 migd.

Water supply for the Cannington Water Distribution System is provided from five wells having a combined capacity of 0.32 migd.

Brock (Beaverton) System

The Beaverton urban area is serviced by a sanitary sewage collection system which discharges to the Lake Simcoe Water Pollution Control Plant. This plant consists of a six-celled waste stabilization pond with a capacity of 0.38 migd based on 180 days retention.

Water supply for the Beaverton water distribution system is provided from the Beaverton Water Supply Plant which has a rated capacity of 1.6 migd.

Metropolitan Toronto

The Municipality of Metropolitan Toronto was created in 1953 by a Provincial Statute which linked the central City of Toronto and its suburban municipalities under a federal plan of representation, with each municipality maintaining autonomy in respect to matters not common to the entire district. The Statute was amended on January 1, 1967, when the federation was consolidated into six municipalities.

Since 1954, the uncoordinated sewer systems of the original 13 municipalities have been added to and converted into an integrated system of trunk sewers servicing the entire region. Responsibility for the provision of local sewers remains with the area municipalities, but it has been possible under the provisions of the Metropolitan Toronto Act to enforce uniform "minimum design" standards throughout the area. Each municipality is required to submit to Metro, for approval, plans of any local work.

The wastewater collection system is about 213 miles in length (341 km) of which 145 miles have been constructed since 1954. The system comprises 178 miles (285 km) of sanitary, 12 miles (19 km) of storm, and 23 miles (37 km) of combined sewers.

In the early planning stages, it became evident that Metropolitan expenditures on sanitary facilities would inevitably be high, and that careful priorities must be established. Consequently, storm sewer construction was delayed wherever possible, and policy was adopted of using existing watercourses, maintaining them in their natural condition with only such work as was necessary to protect them from erosion during heavy storm discharge.

More recently, area municipalities have initiated a policy of separating stormwater from combined sewers by constructing separate storm sewers, as part of a long term program. Simultaneously, permissive legislation has been obtained for a Metropolitan subsidy for this purpose.

In 1954, the sewer systems of the original 13 municipalities served 18 water pollution control plants scattered throughout the Metropolitan area. These plants were quite inadequate for the needs of a growing community, and a phased master plan was adopted by the Metropolitan Council. This plan called for the establishment of large modern facilities at the mouths of the

major rivers, and for the gradual closing-down of most of the existing small, outdated plants. The four "permanent" water pollution control plants required for the proper servicing of the Metropolitan Toronto area have been established, enlarged, and improved to the point where current needs are adequately serviced, and planned expansions are underway to meet the next growth phase.

The four plants serve the following drainage areas in Metropolitan Toronto:

- the Humber River drainage basin which drains to the Humber Sewage Treatment Plant;
- the North Toronto drainage basin which drains to the existing North Toronto Sewage Treatment Plant;
- the Don River drainage basin which drains to the existing Main Sewage Treatment Plant at Ashbridge's Bay;
- the Highland Creek drainage basin which drains to the existing Highland Creek Sewage Treatment Plant.

Humber Sewerage System

The Humber Plant is located on a 110 acre site near the mouth of the Humber River and serves the Cities of Etobicoke, York and a portion of the west end of North York and Toronto. The plant began operation in 1960 with a capacity of 50 migd. Over the years, the plant has been enlarged to its present capacity of 90 migd.

The Humber Plant was built in 1960 as a conventional activated sludge plant. Since that time a number of process modifications and plant expansions have been carried out. The sludge produced at this plant is anaerobically treated and pumped to the Mid-Toronto Interceptor Sewer and conveyed to the Main Sewage Treatment Plant for final disposal.

The Humber Plant receives sewage flows from a system of sanitary trunk sewers and some combined trunk sewers. The system includes the Black Creek Sanitary Trunk sewer (STS), the Humber STS, the North Mimico Creek STS, the South Mimico Creek STS and the Lakeshore STS.

North Toronto Sewerage System

The North Toronto Treatment Plant, the first stage of which was built in 1927-28, has the distinction of being one of the first plants in North America to use the biological activated sludge process. The plant is located in the Don Valley on a 67.1 acre site and serves a population of about 55,000. The plant operates at a controlled uniform rate of 7.5 migd. Sewage in excess of the plant capacity is diverted to the North Toronto Trunk Sewer and thence conveyed to the Main Treatment Plant via Coxwell Sanitary Trunk Sewer.

The North Toronto Treatment Plant provides approximately 20% of the flow of the Don River at the point of its outfall and its effluent quality is generally better than the quality of the Don River upstream of the plant. The effluent also contains a chlorine residual which reduces the upstream pollution of the Don River. The sewers flowing to this plant include a number of combined trunk sewers and the North Toronto Storm Trunk Sewer.

Don River Sewerage System

The Don Trunk Sewerage System drains to the Main Sewage Treatment Plant at Ashbridge's Bay. This watershed includes parts of the municipalities of York, East York, North York, Scarborough and Toronto. The sewerage system includes both combined and separate sewers.

The Main Treatment Plant covers an area of 100 acres. It is the largest water pollution control plant in Metropolitan Toronto. The plant employs over 400 people in operations and maintenance including a modern control laboratory.

The Main Sewage Treatment Plant receives sewage flows from the Low Level, High Level, Mid-Toronto, Queen Street, Lakefront and Coxwell Avenue interceptors which serve approximately 1.25 million people in Metropolitan Toronto. The plant is a conventional activated sludge plant designed to provide complete treatment to 180 migd and primary treatment to 300 migd with an effluent discharge to Lake Ontario. During storm events, plant effluent quality deteriorates as flows increase. The sludge produced at this plant is thermally conditioned and incinerated.

Highland Creek Sewerage System

The Highland Creek Treatment Plant is located at the mouth of Highland Creek on a 145 acre site in the City of Scarborough (West Hill). The plant serves an area of approximately 34,300 acres, and a connected population of 310,000. The original plant construction was initiated by the Municipality of Scarborough under an agreement with the Municipality of Metropolitan Toronto in 1954, and construction completed in 1956.

The Highland Creek, Morningside and Meadowvale Sanitary Trunk Sewers drain to the Highland Creek STP. This plant is a conventional activated sludge plant rated at 48 migd discharging effluent to Lake Ontario. The sludge produced at the plant is thermally conditioned and incinerated.

Metropolitan Toronto Water System

The Metropolitan Toronto Water System is supplied by four large water supply plants at the lakefront as follows:

R.L. Clark Plant -	145 migd
Island Plant -	90 migd
R.C. Harris Plant -	220 migd
F.J. Horgan Plant -	100 migd
Total	555 migd

The R.L. Clark and F.J. Horgan Plants have water intakes that are sized for an ultimate capacity of 450 migd.

From the lakefront, the system extends to the higher areas with groups of pumping stations, trunk mains and storage facilities. The system is divided into pressure districts extending from District 1 generally at the Lake to Pressure District 6 in the Steeles Avenue/Keele Street area. The Metropolitan water transmission system consists of about 190 miles (500 km) of water mains.

The Metropolitan Toronto Water System also serves the south service district of the Regional Municipality of York including the City of Vaughan and the Towns of Richmond Hill and Markham.

Region of York

York Region is comprised of nine area municipalities. The City of Vaughan, Towns of Markham, Richmond Hill, Newmarket, Aurora, Georgina, Whitchurch - Stouffville, East Gwillimbury and the Township of King all rely on the Regional government for water supply and major sewage works and treatment. The estimated 1991 population was 485,000. The 1992 operating budgets for water and sewage are $28.5 million and $26.5 million respectively. The 5 year Capital Forecasts for water and sewage call for expenditures of $50 million and $39 million.

York/Durham Sewage System

An estimated 1991 population of 395,000 relies on the York/Durham Sewage System (YDSS) for sanitary servicing. The YDSS services the urban areas of Vaughan, Markham, Richmond Hill, Aurora and Newmarket. The system consists of a trunk sewer network and associated pumping stations which deliver sewage flows to the Duffins Creek Water Pollution Control Plant in Pickering. The WPCP is a shared facility serving both Durham and York Regions. The ultimate planned capacity is 160 migd.

Water Pollution Control

The Region of York operates seven water pollution control plants ranging in capacity from 0.15 migd to 2.7 migd. Lake Simcoe based plants service the communities of Sutton, Keswick, Schomberg, Holland Landing and Mount Albert. The communities of Kleinburg and Stouffville rely on WPCP's in the Lake Ontario based watersheds of the Humber River and Duffins Creek.

York Water System (South)

A population of approximately 320,000 in the urban areas of Vaughan, Markham and South Richmond Hill derives its water supply from an extension of Metro Toronto's Lake Ontario based system. Five pressure zones maintain suitable supplies over topography ranging from 68 m to 207 m above Lake Ontario. Groundwater supplies are currently relied on to serve the additional 75,000 population on the YDSS in the Towns of Aurora, Newmarket and the Richmond Hill community of Oak Ridges.

York Water System (North)

The Keswick and Sutton communities draw their water supply through water supply plants situated on the southern shore of Lake Simcoe. The plant capacities are approximately 3.0 migd and 0.5 migd respectively.

The region provides groundwater supplies to service 10 communities ranging in population from 1,800 to 45,000. The Mount Albert system consists of one-500 imperial gallons per minute (igpm)

well while the Newmarket supply is derived from 12 wells ranging in size from 350 to 1000 igpm. All the regional wells pump directly to the distribution system and typically include chlorination and iron sequestering.

3.1.2 RESERVE CAPACITY OF EXISTING SYSTEMS

Region of Halton

Exhibit 3.2 summarizes the utilization of the existing water pollution control plant capacities in the Region of Halton. As indicated, the existing plants have a total reserve capacity of 13.16 migd.

The existing utilization rates for the water supply plants and major wells in the Region of Halton are shown in Exhibit 3.3. As indicated, there is little reserve capacity in the existing supply facilities with the 1991 utilization averaging 97% of the existing plant/pumps capacity.

Region of Peel

South Peel trunk sewers were originally constructed by two methods: deep tunnel and open cut. Both east and west trunks, south of Dundas Street, are generally in tunnel sections and are substantially oversized. Sewers to the north were generally in open cut areas and future twinning could be relatively easy to accommodate.

That philosophy has resulted in a total capacity for both the East and West Trunk Sewer Systems of three million equivalent people minimum, i.e. both residential and industrial. This equates to almost twice the present Official Plan level of growth for all area municipalities in the region.

Exhibit 3.4 indicates the current utilization of the South Peel Water Pollution Control Plants and Water Supply Plants. The Water Pollution Control Plants at Clarkson and Lakeview are upgraded as and when the need occurs. This ensures an efficient operation of the system and optimum usage of the available funding. Similarly, the Lorne Park and Lakeview Water Treatment Plants are upgraded as and when the need occurs.

South Peel watermains were generally constructed in open cut and future "twinning" is carried out as required. Normally different routes are chosen for security of the system, i.e. if one feeder main is broken this does not cause the second feeder main to be affected.

Region of Durham

Exhibit 3.5 summarizes the capacity status of the Water Pollution Control Plants in the Region of Durham. As indicated, the reserve capacity of the existing plants in 39.77 migd of which 30.59 migd is at the Duffin Creek WPCP. The substantial reserve capacity at Duffin Creek WPCP is due in part to the provisions that were made for the development of the Seaton community and for the proposed airport. These developments have not proceeded to date although the sewerage capacity allocations remain in place.

The utilization of water supply plant capacity in the Region of Durham is summarized in Exhibit 3.6. About 79% of the existing capacity is utilized with most of the reserve capacity being located in the Pickering/Whitby/Oshawa systems.

EXHIBIT 3.2

CAPACITY UTILIZATION - WATER POLLUTION CONTROL PLANTS REGION OF HALTON

Plant	1991 Service Population	Existing Plant Capacity (migd)*	1991 Actual Flow (migd)	1991 Utilization (%)	Reserve Capacity of Plants (migd)
Burlington	125,200	20.00	17.31	87	2.69
S.E. Oakville	31,240	7.00	4.02	57	2.98
S.W. Oakville	47,260	10.00	8.80	88	1.20
Mid Halton (Oakville)	29,200	4.50	2.19	45	2.31
Milton	23,497	2.84	2.23	79	0.61
Georgetown	19,283	5.00	1.88	38	3.12
Acton	6,610	1.00	0.75	75	0.25
Total/ Average	**283,600**	**50.34**	**37.18**	**74**	**13.16**

*migd - million imperial gallons per day; 1.0 migd is equivalent to 4.546 million litres per day and to 4546 cubic metres per day.

EXHIBIT 3.3

CAPACITY UTILIZATION - WATER SUPPLY PLANTS/WELLS
REGION OF HALTON

Plant	1991 Service Population	Existing Plant/Pump Capacity (migd)	1991 Maximum Day Flow (migd)	1991 Utilization (%)	Reserve Capacity of Plants/ Pumps (migd)
Burlington	129,250	36.0[1]	32.0	89	4.0
Oakville	103,630	24.0[2]	25.4	106	(1.4)
Acton	6,610	1.1	1.0	91	0.1
Georgetown	19,820	4.4	3.7	84	0.7
Milton	23,500	2.9[3]	4.2	145	(1.3)
Total/ Average	**282,810**	**68.4**	**66.3**	**97**	**2.1**

[1]1992 capacity is 40.0 migd

[2]1992 capacity is 25.0 migd

[3]1992 capacity is 5.9 migd

EXHIBIT 3.4

CAPACITY UTILIZATION - SOUTH PEEL WATER AND SEWAGE SYSTEM
WATER SUPPLY AND WATER POLLUTION CONTROL PLANTS

Water Supply Plants	1990 Service Population	Existing Plant Capacity (migd)	1991 Maximum Day Flow (migd)	1991 Utilization (%)	Reserve Capacity of Plant (migd)
Lakeview	465,100	100	87	87	13
Lorne Park	224,500	50	55	110	(5)
Total/Average	**689,600**	**150**	**142**	**95**	**8**

Water Pollution Control Plants	1990 Service Population	Existing Plant Capacity (migd)	1991 Average Day Flow (migd)	1991 Utilization (%)	Reserve Capacity of Plant (migd)
Lakeview	510,000	62	56	90	6
Clarkson	190,000	24	21	88	3
Total/Average	**700,000**	**86**	**77**	**90**	**9**

EXHIBIT 3.5

CAPACITY UTILIZATION - WATER POLLUTION CONTROL PLANTS
REGION OF DURHAM

Water Pollution Control System	1990 Service Population	Existing Plant Capacity (migd)	1990 Average Day Flow (migd)	1990 Utilization (%)	Reserve Capacity of Plants (migd)
Pickering/Ajax					
Duffin Creek W.P.C.P.	Durham 106,245	80.00	York & Durham 49.41	62	30.59
Whitby/Oshawa/ Newcastle (Courtice)					
Pringle Creek W.P.C.P.	23,761	3.25	1.60	49	1.65
Corbett Creek W.P.C.P.	42,039	8.00	4.70	59	3.30
Harmony Creek W.P.C.P.	116,979	15.00	12.85	86	2.15
TOTAL	182,779	26.25	19.15	73	7.10
Newcastle (Bowmanville)					
Port Darlington W.P.C.P.	14,522	3.00	1.61	54	1.39
Newcastle (Newcastle)					
Graham Creek W.P.C.P.	4,650	0.40	0.36	90	0.04
Scugog (Port Perry)					
Nonquon River W.P.C.P.	5,461	0.70	0.52	74	0.18
Uxbridge (Uxbridge)					
Uxbridge Brook W.P.C.P.	5,226	0.80	0.50	62	0.31
Brock (Sunderland)					
Beaverton River W.P.C.P. #1	796	0.16	0.07	41	0.10
Brock (Cannington)					
Beaverton River W.P.C.P. #2	1,827	0.24	0.16	69	0.07
Brock (Beaverton)					
Lake Simcoe W.P.C.P.	2,789	0.38	0.38	99	0.00
Total/Average	**324,295**	**111.93**	**72.16**	**64**	**39.77**

EXHIBIT 3.6

CAPACITY UTILIZATION - WATER SUPPLY PLANTS
REGION OF DURHAM

Water Supply System	1990 Service Population	Existing Plant Capacity (migd)	1990 Maximum Day Flow (migd)	Capacity Usage (%)	Reserve Capacity (migd)
Pickering/Ajax					
Ajax W.S.P		12.00			
Harwood Ave. P.S.		12.00			
TOTAL	106,245	24.00	18.40	77	5.60
Whitby/Oshawa/ Newcastle (Courtice)					
Whitby W.S.P.		24.00			
Oshawa W.S.P		27.00			
Harwood Ave. P.S.		-12.00			
TOTAL	182,779	39.00	34.14	88	4.86
Newcastle (Bowmanville)					
Bowmanville W.S.P.		4.00			
Spring Supply		0.35			
TOTAL	14,522	4.35	3.70	85	0.65
Newcastle (Newcastle)					
Newcastle W.S.P.	5,084	1.80	0.79	44	1.01
Newcastle (Orono)					
Orono W.S.P.	1,640	0.29	0.26	90	0.03
Scugog (Port Perry)					
Port Perry W.S.P.	6,161	2.02	0.99	49	1.03
Uxbridge (Uxbridge)					
Uxbridge W.S.P.	5,226	1.69	0.72	43	0.97
Brock (Sunderland)					
Sunderland W.S.P.	796	0.47	0.21	45	0.26
Brock (Cannington)					
Cannington W.S.P.	1,827	0.32	0.23	73	0.09
Brock (Beaverton)					
Beaverton W.S.P.	2,789	1.60	0.55	34	1.05
Total/Average	**327,069**	**75.53**	**59.99**	79	15.54

Metropolitan Toronto

The utilization of the Metropolitan Toronto water supply plants and water pollution control plants is summarized in Exhibits 3.7 and 3.8 respectively.

In general terms the trunk sewerage systems that were implemented in conjunction with the formation of Metropolitan Toronto in the mid 1950's have reached capacity. Relatively little reserve capacity exists in the four drainage basins and a number of interim measures have been introduced to provide for new development in the short term. Major plant and trunk system improvements are required in all drainage basins.

Similarly, relatively little reserve capacity is available in the Metropolitan Toronto water system, although the basic system is sized to permit ready expansion.

The existing water supply agreement between Metropolitan Toronto and the Region of York provides for the supply of 30 migd (average day consumption) to York. Recent consumption in the Region of York has exceeded this allocation and negotiations are being held among the parties to increase the amount of water to be supplied to the Region of York from Metropolitan Toronto.

Region of York

Exhibit 3.9 summarizes the reserve capacity in the Region of York based on information provided to the Office of the Greater Toronto Area (OGTA) in 1989.

Based on this information it was estimated that the remaining equivalent population capacity in the system was in the order of 442,500 people over and above the 1989 equivalent population of 436,740 people (which includes provision for industry as well as residential population). There are capacity limitations in certain segments of the system such as the Maple Collector which is now over capacity.

The main water system constraint on growth in southern York Region is supply capacity from the Metropolitan Toronto system. In the northern part of the region, the ground-based water sources could be approaching capacity.

3.1.3 DEFICIENCIES IN EXISTING SYSTEMS

While there are specific local deficiencies in each of the Regions of Durham, York, Peel and Halton there is generally speaking capacity in each of these regions to accommodate additional development. The major water and sewer deficiencies in the GTA are in Metropolitan Toronto where the systems planned in the mid 1950's in conjunction with the formation of Metropolitan Toronto have essentially reached their capacity and major improvements are required to upgrade the existing plant.

In addition to overcoming existing deficiencies special measures are required to upgrade the existing systems to achieve environmental objectives. For example, existing combined sewer over flows (CSO's) need to be reduced to improve water quality, e.g. through detention storage combined with treatment at water pollution control plants. Stormwater management measures are also required, in particular with respect to the quality of stormwater runoff.

EXHIBIT 3.7

CAPACITY UTILIZATION - WATER SUPPLY PLANTS
METROPOLITAN TORONTO

Water Supply Plant	1991 Residential Population (000)	Existing Plant Capacity (migd)	1990 Maximum Daily Flow (migd)	1990 Utilization (%)	Reserve Capacity (migd)
R.L. Clarke	690,000	145	130	90	15
Island	286,000	60	81	135	-21
R.C. Harris	1,048,000	220	175	80	45
F.J. Horgan	476,000	100	103	103	-3
Total	**2,500,000**	**525**	**489**	**93**	**36**

EXHIBIT 3.8

CAPACITY UTILIZATION - WATER POLLUTION CONTROL PLANTS METROPOLITAN TORONTO

Water Pollution Control Plant	Residential Population (000)	Existing Plant Capacity (migd)	1990 Average Daily Flow (migd)	1990 Utilization (%)	Available Capacity (migd)
Humber	565,000	90	92	102	-2
Main (Ashbridges Bay)	1,078,000	180	173	96	7
North Toronto	150,000	8	8	100	0
Highland Creek	380,000	48	41	85	7
Total	**2,173,000**	**326**	**314**	**96**	**12**

EXHIBIT 3.9

UTILIZATION OF SANITARY TRUNK SEWER CAPACITY
REGION OF YORK

Area Municipality	1988 Service Population	YDSS * Allocation (migd)	1988 Flows (migd)	Utilization (%)	Reserve Trunk Sewer Capacity (migd)
Newmarket	37,000	8.06	3.41	42.3	4.65
Aurora	23,200	5.57	2.65	47.6	2.92
Richmond Hill	55,700	18.34	5.52	30.1	12.82
Vaughan	85,300	25.03	8.19	32.7	16.84
Markham	126,000	25.35	12.11	47.8	13.24
Total/ Average	**327,200**	**82.35**	**31.88**	**38.7**	**50.47**

*York/Durham Sewage System

3.1.4 OPPORTUNITIES FOR MAXIMUM UTILIZATION OF EXISTING FACILITIES

The opportunities to maximize the utilization of existing water and sewer systems in the GTA include:

- **a unified commitment to water conservation measures throughout the GTA;**
- **the introduction of full cost-based pricing;**
- **the use of growth management strategies** which encourage locating growth of people and jobs in areas where there is available water and sewerage capacity;
- **interregional cooperation to utilize existing capacities in order to resolve deficiencies;**
- **water and sewerage system management measures** aimed at increasing throughput with minimum capital investment.

The potential of these types of initiatives is discussed below:

Conservation Measures

The most significant measure available to alter water and sewer infrastructure needs is a unified commitment to conservation. Infrastructure planning within the GTA has traditionally been driven by supply management. Marginal annual increases in per capita consumption (water) or generation (sewage) have typically been accounted for in planning for capital works. The concept of demand management is rapidly becoming accepted as a viable means of deferring major capital projects.

Reports recently completed by Environment Canada suggest that, with the exception of the United States, average per capita water consumption in Canada exceeds that of comparable countries by an approximate factor of two. The Ontario Ministry of Natural Resources has further revealed that water consumers in the province typically pay for only 65% of the actual costs. Studies recently undertaken by Metropolitan Toronto and Waterloo Region suggest that demand reductions ranging from 10% to 20% can be reasonably anticipated through the introduction of a "user pay" approach incorporating conservation initiatives.

Population forecasts for the next 30 years suggests that an additional two million people are expected to take up residence within the GTA. With an existing population of roughly four million, it is conceivable that achieving the lower estimate of 10% reduction in per capita consumption, could offset a major portion of the capital expenditures otherwise required.

Water conservation also results in diminished sewage generation rates. The impact on capital sewage projects is not as clear, however, due to ongoing efforts to detain combined sewer flows and stormwater flows for subsequent treatment.

The Ministry of Natural Resources has announced a water efficiency initiative intended to achieve zero growth in total provincial water use to the year 2011. (It should be noted that municipal water use represents about six percent of total provincial water use.)

The success of water conservation measures, in a consistent fashion across the entire GTA, requires even further provincial commitment. Legislative changes (i.e. Plumbing Code revisions)

are necessary to ensure that water saving devices become standard in all new construction and retrofitting.

On a local level, off-peak lawn watering, alternate day lawn watering and landscaping alternatives to traditional grasses (i.e. xeroscaping) need to be promoted to offset appreciable peaking in summertime water consumption demands due primarily to lawn watering.

The implications of reducing average per capita water consumption by 10% to 20% combined with a commensurate reduction of seasonal peaking are considerable. Capacity requirements for the ultimate population could reasonably be expected to be 10% to 20% less than that otherwise planned. A more significant implication comes from recognizing the ability to extend the capability of many elements within the existing infrastructure to accommodate 10% to 20% of the projected long term growth.

Full Cost Pricing

At present, only few municipalities in the GTA practise full cost pricing. It is estimated that existing charges for water and sewer services in the Province represent only 65% of the total costs to deliver such services. Increasing the charges to recover all costs together with the earmarking of these revenues to water and sewer programs would have two benefits as follows:

- the introduction of full cost pricing and full water metering encourages conservation by discouraging excessive consumption;

- the earmarking of water and sewer revenues to the operation and development of these systems provides a proper financing base for efficient and effective operation and maintenance of the system.

In addition, full cost pricing is a positive incentive for technological advances. It is a well known principle of economics that underpricing a resource inhibits technological innovation whereas full-cost pricing provides an incentive for innovation.

Urban Growth Management

As indicated in section 3.1.2 there is significant remaining capacity in the existing sewerage systems in the Regions of Peel, Durham, York and Halton much of which has been committed to planned development. The Peel systems alone can accommodate an additional population in excess of two million people.

There is some potential for nodal growth in areas with significant reserve capacity. There are other factors of course which come into play in establishing urban growth management policies but certainly the availability of existing water and sewer capacities is a factor to be considered.

Interregional Cooperation

Ideally, water and sewer systems should be operated on a drainage area basis rather than on a political area basis; otherwise additional costs such as for lengthy forcemains and pumping are incurred. At present, the political boundaries in the GTA are imposing jurisdictional constraints on the utilization of existing capacity. For example, a portion of eastern Peel Region is more readily serviced from Metropolitan Toronto because it is in the Humber drainage basin. Similarly, there are opportunities for the sharing of water and sewer capacities in the areas along the

boundary between the Regions of Peel and Halton, e.g. some Halton sewage could be directed to the Clarkson WPCP in Peel. Water distribution capacity in Oakville could be extended into Halton. Milton and Georgetown could be linked to lake based services via the South Peel System. Possibly, the Region of York could receive some water supply via Durham in the long term. Indeed, because York does not have frontage on Lake Ontario, it is dependent on interregional cooperation.

Water And Sewer System Management

Water and Sewer Systems Management encompasses both supply management and demand management. Taken together there is significant potential with judicious capital improvements to improve the utilization of the existing systems. For example, the use of detention storage facilities will provide interim capacity in both the Don Trunk Sewerage System and the Black Creek System in Metropolitan Toronto to mitigate existing wet weather problems and to provide interim capacity for additional urban development.

Computer-based simulation models are being developed to simulate the operation of water pollution control plants and water supply plants. Such models offer potential to improve the effectiveness of plant operations.

The improvement of information on the utilization of existing systems is fundamental to improving the effectiveness and the management and operation of the existing systems. Full monitoring on the York/Durham Sewage System has indicated that actual flows are below those projected at the time of design thus indicating that there is potential for additional urban development without an attendant increase in trunk sewer capacity.

3.2 PLANNED EXPANSIONS AND CAPITAL BUDGETS

3.2.1 PLANNED EXPANSIONS BY REGION

This section of the report describes the expansions of the trunk, water and sewerage systems that are currently proposed in each of the five regional municipalities in the GTA. These expansions are indicated in Exhibits 3.1(A) and 3.1(B). Exhibit 3.1(A) shows the planned extensions of trunk watermains, and the planned expansions of water treatment plants, and new reservoirs. Exhibit 3.1(B) shows the planned extensions of the trunk sanitary sewers, the planned expansions of existing water pollution control plants, and a new plant in the Town of Newcastle.

Region of Halton

The planned expansions of the existing water and sewerage systems in the Region of Halton include the following proposals:

Oakville

- an expansion to the Oakville Water Purification Plant;
- an expansion to the Mid Halton Wastewater Treatment Plant;
- establishment of a Pressure Zone 4 system;
- construction of associated trunk water and wastewater mains;

- construction of associated water storage.

Burlington

- completion of the construction of the Appleby Reservoir;
- an expansion to the Burlington Water Purification Plant;
- an expansion to the Burlington Wastewater Treatment Plant;
- construction of associated trunk water and wastewater mains;
- construction of associated water storage.

Milton

- water source investigations to obtain additional water supplies;
- completion of the Halton Urban Structure Review, which will investigate the feasibility of servicing Milton from lake-based water and wastewater systems.

Acton

- obtaining permission to take water from the Prospect Park Well at a rate yet to be approved by the Ministry of the Environment, pending the results of the Acton Area Water Resource Study;
- construct a standby well at the Prospect Park Well site at a rate to be determined as the result of the Acton Area Water Resource Study;
- review the requirements for expanding the existing reservoir.

Georgetown

- selecting an alignment for additional trunk wastewater main capacity to service areas identified in the secondary plan;
- identifying and developing additional sources of water to meet the ultimate water demands.

Region of Peel

Major upcoming works in the Region of Peel include the following:

- a 12.5 migd expansion of the Lakeview Water Pollution Control Plant;
- a 12.0 migd expansion of the Clarkson Water Pollution Control Plant capacity;
- construction of the Airport Road Trunk Sewer to service Caledon East;;

- expansion of the Lakeview Water Purification Plant to provide service for an additional 120,000 people;

- construction of major feedermains for the water system including the Bolton/Brampton feedermain.

Parts of East Brampton and East Caledon are located within the Humber River drainage shed and expansion of sanitary services to these areas requires pumping facilities to discharge to the Etobicoke Creek Trunk sewer.

Region of Durham

Pickering/Ajax System

A Class Environmental Assessment was initiated in 1989 for construction of a new water supply plant to provide additional water supply capacity for the Pickering/Ajax and the Whitby/Oshawa systems. The new plant is planned for an ultimate capacity of 72 migd with the initial construction of a 36 migd module. The Class Environmental Assessment for the project was completed in July 1991 and is awaiting the Minister's decision on the request for "bump up".

On construction of the initial 36 migd module of the new water supply plant, it will be possible to discontinue the transfer of water from the Whitby/Oshawa system to the Pickering/Ajax system, which will relieve the available capacity for the Whitby/Oshawa system by 12 migd.

Whitby/Oshawa/Newcastle (Courtice) System

Construction for expansion of the Corbett Creek Water Pollution Control Plant is scheduled to start in 1992 to increase the existing plant capacity from 8 migd to 16 migd. Further expansions to the Corbett Creek and Harmony Creek Water Pollution Control Plants are planned in the 20-year capital works program. In addition, a planning study has been initiated to examine the servicing options for the ultimate growth in the Whitby, Oshawa and Courtice urban areas, including the options of constructing a new water pollution control plant in Courtice and diversion of sewage to the York/Durham Sewage System.

Upon construction of the new water supply plant for the Pickering/Ajax system, water supply capacity available for the Whitby/Oshawa/Newcastle (Courtice) system will be increased from 39 migd to 51 migd. In addition, expansion of the Whitby Water Supply Plant is planned in the 20-year capital works program to increase the capacity by 18 migd.

Newcastle (Newcastle) System

A Class Environmental Assessment is being conducted for the proposed construction of a new plant to replace the existing Graham Creek Water Pollution Control Plant. The new plant will be designed for an ultimate capacity of 5.4 migd with the initial construction of 0.9 migd module.

Scugog (Port Perry) System

A Class Environmental Assessment was initiated in 1991 for the proposed construction of a mechanical water pollution control plant of 1.0 migd capacity to serve the Port Perry urban area.

Uxbridge (Uxbridge) System

At present, a Class Environmental Assessment is being undertaken to establish the feasibility of expanding the Uxbridge Brook water pollution control plant capacity to 1.2 migd within the effluent guidelines of the Ministry of the Environment.

Brock (Beaverton) System

A Class Environmental Assessment is being carried out in preparation for the construction of a new mechanical water pollution control plant to increase the capacity to 1.0 migd for the Beaverton urban area.

Metropolitan Toronto

Extensive improvements to the trunk, water and sewage systems are planned in the Metropolitan Toronto area including the following:

- proactive water conservation program;
- expansion of the Highland Creek, Humber and Main Sewage Treatment Plants;
- rehabilitation of the North Toronto Sewage Treatment Plant;
- expansion of the R.L. Clarke and F.J. Horgan Water Treatment Plants to meet requirements in both Metropolitan Toronto and the Region of York;
- construction of the Keele Street Trunk Relief Sewer, possibly including an oversizing to accommodate future needs in the Region of York;
- construction of the Don Trunk Relief Sewer System;
- initiatives for combined sewer overflow (CSO) removal including a possible interceptor sewer along the Toronto waterfront together with new treatment facilities at Ashbridge's Bay.

Region of York

The Metropolitan Toronto Water Supply System will likely be expanded to meet future requirements in the southern part of York. Studies have been initiated to examine the alternative sources of water supply for the northern parts of the Region of York.

The need for additional sewerage system capacity in the City of Vaughan may be met through the provision of additional capacity in the Keele Street Trunk Relief Sewer and in the Humber Treatment Plant. Alternatively, this sewerage system capacity might be accomplished through expansion of the existing York Durham Sewage System and increased capacity of the Duffin Creek WPCP.

3.2.2 PROPOSED CAPITAL BUDGETS BY REGION

Region of Halton

Exhibit 3.10 summarizes the sewer and water projects for the Region of Halton for the period 1992 - 1996. As indicated, an expenditure of some $167.8 million is forecast for water system projects during the period 1992-1996 and $64.8 million for sewer projects.

Region of Peel

The 1992 capital budget and forecast to 1996 for the South Peel Water and Sewage System and for Peel Regional capital projects are summarized in Exhibit 3.11. As indicated, expenditures of $195.0 million and $94.8 million for water and sewer projects respectively are forecast for the period 1992-1996.

Region of Durham

The 1992-1996 construction program for water works and the sanitary sewage system in Durham is summarized in Exhibit 3.12. Expenditures of $193.3 million and $127.1 million are forecast for water works and the sanitary sewerage system, respectively.

Metropolitan Toronto

The capital program for the years 1992-1996 for the Municipality of Metropolitan Toronto's water supply and water pollution control shown in Exhibit 3.13. More than two-thirds of the forecast expenditure of $822.4 million is for sewerage/water pollution control.

Region of York

The 1992 5-year capital budget forecast for water and sewer projects in the Region of York is summarized in Exhibit 3.14.

In addition, to the indicated expenditures of $89.3 million, the Region has budgeted $9.5 million of recoverable costs for Highway 407 watermain and sewer relocations.

Summary

Exhibit 3.15 summarizes the 5-year regional capital programs described above. A total expenditure of $862.7 million is forecast for water system projects in the GTA over five years, and $891.6 million for water pollution control/sanitary sewerage projects, for a total expenditure of $1.8 billion. These expenditures represent a total average annual expenditure of $350 million on water and sewer infrastructure. These expenditures are aimed at expanding capacities through to the turn of the century and beyond, and in meeting evolving environmental standards.

3.3 INFRASTRUCTURE REQUIREMENT TO SUPPORT THE GTA VISION

3.3.1 SERVICING CONSTRAINTS AND PRINCIPLES

The fundamental constraints on the development of sewer and water services in the GTA comprise the following:

EXHIBIT 3.10

SEWER AND WATER PROJECTS
REGION OF HALTON
1992-1996

Year	Water System Projects ($'000)	Sewerage System Projects ($'000)
1992	19,457	8,803
1993	52,794	31,057
1994	44,207	14,033
1995	20,337	4,195
1996	30,961	6,714
Total 1992-1996	**167,756**	**64,802**

EXHIBIT 3.11

1992 CAPITAL BUDGET AND FORECAST TO 1996
WATER AND SEWER
REGION OF PEEL

Year	Water System Projects ($'000)	Sewerage System Projects ($'000)
South Peel System		
1992 Budget	13,560	9,740
1993 Forecast	58,350	6,300
1994	17,920	21,610
1995	2,460	21,000
1996	31,100	3,300
Total South Peel	123,390	61,950
Regional Projects		
1992 Budget	15,010	5,120
1993 Forecast	13,410	4,120
1994	18,185	7,020
1995	15,300	8,520
1996	9,710	8,020
Total Regional Projects	71,615	32,800
GRAND TOTAL	**195,005**	**94,750**

EXHIBIT 3.12

1992-1996 CONSTRUCTION PROGRAM
WATER WORKS AND SANITARY SEWAGE SYSTEM
REGION OF DURHAM

Year	Water Works ($'000)	Sanitary Sewerage System ('$000)
1992	18,919	19,956
1993	58,885	30,956
1994	46,067	29,129
1995	36,840	23,540
1996	32,608	23,470
Total 1992-1996	**193,319**	**127,051**

EXHIBIT 3.13

1992-1996 CAPITAL PROGRAM
WATER SUPPLY AND WATER POLLUTION CONTROL
METROPOLITAN TORONTO

Year	Water Supply ($'000)	Sewerage/Water Pollution Control ($'000)
1992	33,032	67,626
1993	53,441	138,620
1994	54,622	152,245
1995	55,056	122,538
1996	60,009	85,178
Total	**256,160**	**566,207**

EXHIBIT 3.14

1992 5-YEAR CAPITAL BUDGET FORECAST
WATER AND SEWER PROJECTS
REGION OF YORK

Year	Water ($'000)	Sewer ($'000)
1992	10,412	395
1993	15,068	3,810
1994	13,681	12,730
1995	6,325	18,472
1996	4,946	3,420
Total	**50,432***	**38,827****

*includes forecast expenditures on York Water System improvements but does not include cost sharing of Metropolitan Toronto based works

**includes York/Durham Sewage System improvements (partial twinning of the Maple Collector Sewer)

EXHIBIT 3.15

SUMMARY OF FIVE YEAR REGIONAL CAPITAL PROGRAMS
WATER SUPPLY AND SEWERAGE SYSTEMS
GREATER TORONTO AREA

Region	Water Systems Projects ($000)	Sewerage Systems ($000)
Halton	167,756	64,802
Peel	195,005	94,750
Durham	193,319	127,051
Toronto	256,160	566,207
York	50,432	38,827
Total	**862,672**	**891,637**

- Water Transfer Between Basins: water transfer is contrary to the policy of the Ministry of Natural Resources and requires approval by the International Joint Commission.

- Lake Simcoe: the lake is a special provincial interest and no new point sources of effluent will be permitted. Phosphorus limits are fixed and controls are being introduced for agriculture and storm drainage in the Lake Simcoe basin.

- York Region: groundwater in the central part of the Region is reaching sustainable limits. Sewage must continue to be directed southerly because of Lake Simcoe policy.

- Halton Region: the northern part of Halton Region has limited development potential unless water and sewer facilities are lake based.

- Shadow of the GTA: there are developments associated with county restructuring, e.g. south Simcoe.

The **guiding principles** that have been developed by the Services Subcommittee are as follows:

- preserve, where practical, servicing capacity of major infrastructure elements over appropriately determined long range planning horizons e.g. 50 years;

- **support the selected urban structure and form**;

- **maximize the use of existing facilities**;

- **ensure the cost effectiveness of selected options**;

- **establish priorities to match urban form**;

- **develop sewage infrastructure on a drainage system basis,** not political (municipal) boundaries

- **develop water infrastructure on a service area basis**;

- **trade available capacities**, e.g. share facilities subject to equitable cost arrangements;

- **avoid duplication of investments**;

- **assess existing service levels**, e.g. lawn watering, hydrant flushing, municipal use, etc.

- **follow sound environmental considerations** through:

  - **storm water management**,

  - **minimize impact on wet lands**,

  - **user pay principle**, e.g. true cost accounting,

  - **reduce combined sewer overflows** (CSO's),

- **conservation**, including:

    - water metering,
    - regional water management plans,
    - leak detention and leak prevention,
    - water pricing on increasing block rates,
    - seasonal water charges.

It is noted that legislative changes will be required when providing infrastructure services that cross municipal boundaries. All Regional Acts would need amendments as would the Ontario Water Resources Act and Environmental Protection Act.

3.3.2 IMPROVEMENT/EXPANSION STRATEGY AND OPTIONS

The basic strategic initiatives and related options with respect to the planning and development of water/sewer infrastructure comprise the following:

- **Optimization of Existing Infrastructure**

    - water supply and water pollution control plant audits,
    - system flow monitoring,
    - detention/storage concepts, i.e. store peak flows and release over time,
    - infiltration/inflow reduction measures,
    - combined sewer overflows (CSO's) reduction.

- **Corridor Protection**

    - master studies,
    - natural geography rather than municipal boundaries.

- **Preservation of Existing Infrastructure**

    - maintenance/rehabilitation program,
    - adequate rate-based funding.

- **Eco System Approach**

    - coordinated planning/engineering,
    - modify the Environmental Assessment Act and Planning Act,
    - overall approval process improvement.

- **Funding**

- adequate for existing development plus growth,
- development charges,
- possible public/private partnerships.

- **Water Conservation**
  - full cost-based pricing of water/sewer services,
  - mandatory water metering,
  - reduction of water/sewage flows,
  - short-term and long-term capital benefits.

- **Innovative Concepts**
  - water transfer, e.g. from Lake Huron/Georgian Bay,
  - groundwater recharge from water pollution control plants.

3.3.3 PREFERRED SERVICING CONCEPTS AND REQUIRED CAPITAL WORKS

This section summarizes the basic sewage and water infrastructure improvements by Region.

Region of Halton

The preferred concept in the Region of Halton includes continuing expansion of the Burlington and Oakville water supply and water pollution control plants. Integration of the Burlington and Oakville water systems will provide substantial benefits. Milton should be served by lake-based water and sewer systems rather than the current stream-based water pollution control system and ground-based water supply. Servicing to Milton will require the development of a new water supply plant on the lakefront. There are opportunities in the Region of Halton for possible joint servicing with the Region of Peel including sharing of water pollution control plant capacities and sharing of water distribution facilities.

Region of Peel

Continuing expansion is planned for the water supply and water pollution control plants and for major feeder mains. There are no infrastructure impediments to development in south Peel. Sewage from East Brampton and Caledon requires pumping to the Etobicoke Creek Trunk Sewer. The South Peel water service should be extended to serve the community of Bolton. Sanitary sewage arising from growth in the Malton area logically should be directed to the Metropolitan Toronto system because it is in the Humber drainage basin. This is another example of inter-regional cooperation with respect to infrastructure development.

Region of Durham

The required works in the Region of Durham for the near term (5-10 years) include the proposed expansions of water supply and water pollution control plants and construction of associated trunk mains and reservoirs. Of particular importance is the proposed new Ajax Water Supply Plant for additional water supply capacity, which capacity is essential for the growth of Durham's dominant major urban centres in the Pickering/Ajax and Whitby/Oshawa/Courtice areas, including the proposed community of Seaton and the proposed airport.

The servicing concept for the longer term requires further expansion of the existing plants and construction of new water supply and water pollution control plants on the lakeshore of the Whitby/Oshawa/Courtice area, due to the lack of site capacity at the existing plants. A planning study has been initiated to examine the long term servicing options including integration of water systems for Whitby/Oshawa/Courtice and Bowmanville, and utilization of the York/Durham sewage system.

Metropolitan Toronto

The perceived water supply problems and needs in Metropolitan Toronto include:

- aging infrastructure needs to be maintained or upgraded to meet new requirements;
- production and distribution system to serve both Metropolitan Toronto and the Region of York is reaching capacity;
- emphasis is being placed on water quality improvements.

In terms of sewerage/water pollution control problems and needs, the major issues include:

- aging infrastructure needs to be maintained;
- sewer systems and plants are reaching capacities;
- stricter operating guidelines are being enforced.

The preferred approach in Metropolitan Toronto centers on a pro-active water conservation program and basic expansion and upgrading of the water and sewer system. The R.L. Clark and F.J. Horgan Water Plants have been designed to facilitate expansion. Water pollution control plant expansions will be required at the Highland Creek, Humber and Main Plants, and the North Toronto Plant will require rehabilitation. Initiatives are also being taken with respect to removing combined sewer overflows. Major improvements will be required in the Don Trunk Sewer System. The Keele Street Trunk Relief Sewer will be required to provide for environmental improvements and new development in the Black Creek basin.

The Services Subcommittee proposes that sewage infrastructure be developed on a drainage area basis rather than on the basis of political boundaries.

For example, the building of Metropolitan Toronto's Keele Sanitary Trunk Relief Sewer provides an opportunity to share capacity with the neighbouring Region of York. The Keele Relief Sewer is required to provide relief to the overloaded Black Creek Trunk Sewer so that combined sewage overflow will be reduced to a frequency of not more than once per year during the average year

and to provide capacity for new development in the sewershed. To serve Metropolitan Toronto's requirements, a sewer diameter of 2.1 metres is required.

Trunk sanitary sewer servicing for the Region of York was provided by the means of the York/Durham Sanitary Trunk Sewer, the capacity of which will not be adequate to service the projected population in the western portion of the Region of York. It has been proposed to increase the size of the Keele Street Trunk Sewer to 2.7 metres to accommodate the sewage transport shortfall in the Region's system. However, the section of Keele Trunk Relief Sewer cannot be utilized by the Region of York until a complete oversized sewer is built from the regional boundary to the Humber Sewage Treatment Plant and the plant is expanded.

Metropolitan Toronto has advised the Province that it is agreeable to oversizing the trunk relief sewer provided that the Provincial Government provides financial commitments to share in the capital and operating costs of the trunk sewer and the treatment plant. Anticipating an early favourable response from the Province, Metropolitan Toronto is prepared to complete the final design of the sewer with construction of the first phase to start early in 1993.

Region of York

There are clear constraints on the amount of new development which can occur in the northern part of York Region. Finite limits to sustainable groundwater supplies servicing Aurora, Newmarket and East Gwillimbury require investigation of alternative supplies. Ultimately, the serviceable population for Lake Simcoe-based communities will be limited by water pollution control capability, in particular, limits on phosphorus. The affected communities include Keswick, Sutton, Schomberg and Mount Albert. Limited assimilative capacity in receiving watercourses establishes growth ceilings for the communities of Kleinburg, Holland Landing and Stouffville. Restrictions on further rural subdivision development (dependent on private servicing) will preclude any significant growth in communities without sewage treatment capabilities.

In the southern part of York Region, there is a need for commitment to a long-term water strategy to recognize the full potential of communities (particularly within the York/Durham Sewage System service area) to absorb anticipated population growth. In addition to consideration of the possible extension of the Keele Trunk Relief Sewer (including routing through the Keele Street sewer to an expanded Metro Toronto Humber plant or connection to the South Peel system), the original design criteria for the York/Durham Sewage System should be reviewed to consider maximizing both the treatment and conveyance capacity of the system.

3.3.4 MAJOR NODES

Water and Sewer Services

Based on the review of the existing systems and the planned programs in the Regions, the Services Subcommittee has concluded that existing servicing capacity and opportunity for near term (5-10 years) as well as longer term expansion are such that achieving growth objectives in all of the major nodes and most of the five intermediate nodes which were also analyzed by the Infrastructure Working Group (see pages S.2-S.4) should be relatively unconstrained from the water/sewer servicing perspective based on regular system expansion over the coming decades.

The one exception is Vaughan, which along with Langstaff, Markham and other nodes in south York region, is served by the York/Durham sewer system and by water from the Metro Toronto system. Because of its location at the end of the York/Durham sewer, Vaughan will experience

servicing constraints during the coming ten years if rapid growth is maintained, and significant system expansion will be required to meet its servicing needs. There are several alternatives for system expansion including expansion of the York/Durham sewer system and/or development of new capacity through Metro Toronto or the Region of Peel to the Lake. This will require more detailed study as a basis for the system expansion necessary to support Vaughan's growth as a node.

Storm Water Management

Consultation with the Metropolitan Toronto and Region Conservation Authority indicates that there are no major problems with the nodal development scenario from a storm water point of view other than policy decisions regarding the quality of storm water which could only be achieved by treatment.

Two-Pipe Water System

It has been suggested that two-pipe water supply systems might be applicable within the GTA i.e. a treated water system for households and an untreated water system for purposes such as lawn watering and industrial uses.

The Services Subcommittee has concluded that such two-pipe systems have limited applicability partly because of the health risks associated with inadvertent cross connections between the two systems. There may be some limited industrial applications near the lake, where a dual-system may be feasible.

Rural Development

The Services Subcommittee has also concluded that subdivision development on septic tile systems is inappropriate given the direction of environmental regulations.

3.3.5 FUNDING REQUIREMENTS

During the ***GTA Urban Structure Concepts Study,*** broad capital cost estimates were prepared for expanding the trunk water and sanitary sewerage systems to the year 2021 to serve a GTA population of 6 million people and total GTA employment of 3.4 million jobs. Although the cost estimates were expressed as $1990, construction costs generally have not escalated because of the recession. Thus, the estimates are probably representative of $1991.

The cost estimates to expand the trunk water and sanitary sewage systems for the Nodal concept were as follows:

Water	$1.7 billion
Sanitary Sewage	$1.8 billion
Total	**$3.5 billion**

It was found that this total expenditure did not vary significantly with the form of development, e.g. spread, concentrated or nodal. In addition to these cost estimates for the trunk systems, the local land development costs including the grading of development areas, installation of local water

and sewer services, stormwater management, and installation of local electric power service, street lighting, streets and sidewalks were as follows:

New Residential Areas	$ 8.0 billion
New Industrial Areas	$ 1.6 billion
Redevelopment of Existing Urban Areas	$ 1.4 billion
Total	**$11.0 billion**

These estimates do not provide for difficult soil conditions and for the disposal of contaminated soils.

It should be noted that the nodal development concept involved substantially reduced land development costs in comparison to the spread development concept (which would reflect existing trends). It was estimated that this saving in land development costs could amount to $4.7 billion ($1990) to the year 2021.

As noted in Section 3.2, the current regional expenditures on water and sewer infrastructure in the GTA are in the order of $350 million per year. This rate of expenditure is aimed at providing additional capacity to the turn of the century and beyond.

The present practice of capital budgeting by individual regions seriously constrains the application of the servicing principles described above. Ideally, full cost-based pricing of water and sewer services should be implemented throughout the GTA to reinforce the water conservation initiatives. In addition, the revenues arising from these charges should be dedicated to the operation, maintenance and development of water and sewer infrastructure in a way similar to that of major public utilities such as electric power and gas. The funding mechanism should also facilitate inter-regional cooperation in order to achieve cost-effective water and sewer services based on topography rather than political boundaries.

3.3.6 REQUIREMENT FOR ENVIRONMENTAL ASSESSMENT

All municipal projects are subject to the Class Environmental Assessment. The Class Environmental Assessment is a environmental assessment with the provision for the municipality to make decisions throughout the process after the environmental concerns of the public have been addressed. Although public concerns can be addressed and mitigating measures provided, objections can lead to a request for a bump-up to a full environmental assessment. Going through the bump-up process can be extremely time consuming and costly and constrains the ability of municipalities to plan the delivery of major infrastructure with any degree of confidence. Projects aimed at improving public health and the environment including improved drinking water quality and sewage effluent quality can be subject to major delays and increase costs with the present approach.

3.4 PROPOSED WATER/SEWER POLICIES AND PRIORITY ACTIONS

3.4.1 EFFICIENT UTILIZATION OF INFRASTRUCTURE

It is recommended that a unified commitment to water conservation be adopted throughout the GTA in order to reduce the future requirements for expanded water and sewer capacity. The success of water conservation measures, in a consistent fashion across the entire GTA, requires even further provincial commitment. Legislative changes (e.g. Plumbing Code revisions) are necessary to ensure that water-saving devices become standard in all new construction and retrofitting.

3.4.2 FACILITATION OF INTER-REGIONAL COORDINATION AND COOPERATION

It is recommended that all major water and sewer works in the GTA be developed on a drainage area basis rather than the present approach which is based on municipal boundaries. For example, sewage from growth in the Malton area in the Region of Peel would be more readily handled through the Metropolitan Toronto Sewage System rather than the more costly alternative of pumping the sewage to the South Peel System.

3.4.3 NODAL DEVELOPMENT

In general, water and sewerage capacity to serve the eleven nodes considered in this report is either available or will become available through planned expansion of the existing systems. The one exception is the City of Vaughan node in the vicinity of Highways 400 and 7. Vaughan, along with Langstaff, Markham and other nodes in south York region, is served by the York/Durham Sewer System and by water from the Metropolitan Toronto System. Because of its location at the end of the York/Durham sewer, Vaughan will experience servicing constraints during the coming ten years if rapid growth is maintained, and significant system expansion will be required to meet its servicing needs. There are several alternatives, including expansion of the York/Durham Sewer System and/or development of new sewer capacity through Metropolitan Toronto or the Region of Peel to the lake. This will require more detailed study as a basis for the system expansion necessary to support Vaughan's growth as a node.

3.4.4 MEASURES TO PROTECT CORRIDORS, SITES AND MAJOR NEW FACILITIES

It is recommended that mechanisms be established in order to designate and protect corridors and sites required for the long-range development of water and sewer systems. To this end, it is recommended that a detailed long-range plan based on the guiding principles described in this report be prepared for water and sewer services in the GTA as a basis for protecting the lands and capacities required for future services.

3.4.5 ENVIRONMENTAL ASSESSMENT AND PLANNING APPROVALS

The Services Subcommittee recommends that the vision, the urban form and associated servicing concepts that are accepted by the Province and the Regions (GTA) be stated in the form of a Provincial Policy Statement. The coordination of planning processes for growth and infrastructure needs to be dealt with in parallel, with master plans for infrastructure forming part of official plan documents. These infrastructure master plans should be dealt with in the context of the environmental assessment process. This statement would satisfy the questions of need and of alternatives under the Environmental Assessment Act.

3.4.6 CAPITAL WORKS PLAN

It is recommended that a coordinated program of major capital water and sewage works in the GTA be defined for the short-term and long-term based on the guiding principles described in this report including the requirement for inter-regional cooperation and for a unified commitment to conservation. At present, some $350 million per year is being invested by the regions in water and sewer infrastructure.

As noted earlier, the required investment can be reduced by some 10% to 20% providing that a proactive water conservation program is initiated throughout the GTA.

3.4.7 MECHANISM TO SECURE THE NECESSARY FUNDING

It is recommended that full cost-based pricing be adopted for the provision of water and sewer services in the GTA. Further, it is recommended that the revenues from these increased charges be dedicated to the operation, maintenance and development of the water and sewer systems.

3.4.8 OTHER ISSUES WHICH REQUIRE FURTHER WORK

About 10,000 m^3 of digested sludge is produced daily at the water pollution control plants in the GTA.

Considering the magnitude of sludge quantities generated in the GTA and cost of disposal, a long-term prospect of sludge management in the GTA should be examined to develop an economically and a environmentally acceptable GTA-wide sludge management plan such as the program in Halton.

****

The Services Subcommittee of the Infrastructure Working Group presents these recommendations on water/sewer policies and priority actions for consideration by government as planning and policy formulation for the Nodal land use development concept proceeds.

GTA 2021
INFRASTRUCTURE REQUIREMENTS

APPENDIX A:
EXISTING TRANSPORTATION DEFICIENCIES

INFRASTRUCTURE WORKING GROUP
TRANSPORTATION SUBCOMMITTEE

MARCH, 1992

APPENDIX A: EXISTING TRANSPORTATION DEFICIENCIES

Committee members were asked to identify existing transportation deficiencies and resulting infrastructure needs and opportunities in the GTA. The following is a summary of that discussion.

DURHAM

- east/west road network at Durham/Metro boundary is at capacity today with few opportunities to add new roads due to Rouge Valley sensitivity
- east/west links affected by Rouge River include:
  - Lawrence/Bayly
  - Finch/Rossland
  - Taunton/Steeles
- Hwy 407 is needed
- In rural areas, heavy trucks (primarily trucks carrying aggregate) represent a substantial portion of local traffic
- Extension of GO Transit service to Oshawa
- Individual municipal transit systems are not effectively coordinated, thus transit integration and high modal splits are difficult to achieve
- Future transit spine needed along Hwy 2 & Hwy 407
- Region needs to create local jobs to reduce traffic movement needs to Metro

YORK

- Hwy 427 extension north of Hwy 407 is needed
- The corridor midway between 9th and 10th Lines and is being protected to serve as a bypass to Markham going north to Major Mackenzie
- 404 extension between Woodbine and Leslie to meet future Hwy 89 extension
- Protection of Newmarket/Richmond Hill/Stouffville rail lines as well as the Havelock or Belleville lines to Seaton
- East/west corridor protection required between Gamble and Bloomington on the southern part of Oak Ridges Moraine
- Jog eliminations needed along Durham and Peel boundaries
- The regionalization of five existing municipal transit systems and taking over of some GO bus lines to form York Regional Transit

PEEL

- Traffic problems on QEW, 401, & 403 (a.m./p.m.)
- Highway 401 congestion at Credit River and south of airport
- Congestion in industrial areas around the airport
- Hwy 409 under utilized because adjacent roads are congested
- Good use of GO lines, 10,000 commuters along the Lakeshore Line which is equivalent to the carrying capacity of 5 freeway lanes
- GO lines expansion - off-peak bus service possible in the short term
- Hwy. 7 & Hwy. 50 deficiencies
- Capacity deficiencies at Credit River cordon

- Regional roads such as Steeles/Derry/Erin Mills to be widened to six lanes
- North/south movements within the Region are becoming a problem
- Major transit corridor needed in the Hwy 10/410 corridor
- Access to airport a problem
- Access from road and bus to GO rail an important link
- Hwy 407 needed from Airport Road to Hwy 401 as well as 401 widening, interchange improvements on the QEW and 403 widening
- Corridor protection needed north of Brampton and south of Bolton
- Transit integration - Brampton to Mississauga; Brampton to Vaughan (York); Mississauga to TTC; Mississauga to GO
- Problem with Mississauga Transit interface with GO & TTC as well as fare integration
- Provision of Mississauga Transitway and HOV lanes on appropriate roads is required

HALTON

- Halton/Peel boundary a problem on QEW, 403, 401 in a.m. and p.m.
- No relief facilities parallel to Hwy 401
- Hwy 403 extension across Halton would provide "missing link" (from QEW to Hwy 5 within 5 years)
- Most movement is East/west in southern Halton between Burlington and Oakville but only the QEW is available
- QEW is used for inter-municipal trips
- Some connections of roads are possible but these are local roads
- Road reclassification study being undertaken
- Starting to see capacity problems on many N/S routes
- North/south links between Milton and Georgetown dependent on growth patterns
- Trafalgar Road has capacity deficiencies
- Capacity problems where Steeles/Derry/Britannia feed into Peel, many east/west arterials to be widened
- Region wants to support transit development and use (Transit Opportunity Study) through laying out land use which is supportive of transit usage
- Halton's two transit systems are not linked
- Transit planning required from a regional perspective

METRO

- Road system basically operating at/near capacity
- Deficiencies in road system around major centres and employment areas such that roads are acting as constraints to further development (e.g. Consumers Road is at employment limit)
- Etobicoke/North York/Scarborough City Centres must rely on additional rapid transit system since roads are at capacity
- Metro/Peel boundary and central segment of York/Metro boundary are major problem areas (study of North Metro Boundary indicates continued pressure in

the future)
- Some missing links in road network - mostly over river valleys
- Expressways are operating at capacity in both directions and peak periods are getting longer
- Transit system (subway) is at capacity south of Bloor Street and is a real bottleneck at Union Station
- Metro wants nodes along transit routes - particularly TTC lines (Yonge/Eglinton, etc.)
- Need to promote two-way use of TTC and GO
- Large capacity surpluses on GO in reverse direction
- Relocation and addition of GO stations to more effectively accommodate nodes
- Congestion problems in suburban areas outside of a more dense roadway network as in core
- Opportunities for expansion are limited and will occur at development nodes such as North York City Centre and Scarborough City Centre

T.T.C.

- Improvements required in the quality of service
- Implementation of strategies for transit priority on Metro roads
- High density development needs to be encouraged in support of good quality transit
- Rapid transit expansion required beyond Let's Move
- Future rapid transit needs should be assessed. Examples under joint Metro/TTC study include:
    - Northeast Scarborough with the possible extension of the Scarborough Rapid Transit to Finch Avenue
    - along Eglinton Avenue with the possible extension of the Eglinton Rapid Transit from Eglinton West Station east to Kennedy station on the Scarborough Rapid Transit
    - Northwest Metro west from the extended Spadina subway along Finch, possibly turning south in the vicinity of Hwy 27, proceeding to connect to the Eglinton Rapid Transit
- Fare integration and coordination of cross-boundary services
- Improved integration and coordination of transit planning and operations at the GTA level is required

SCARBOROUGH

- Scarborough wants Sheppard Subway extension to support Scarborough Town Centre
- Support Markham/Sheppard Centre (transit gateway) by extension of LRT service in the next 10 years
- Better links to Durham are needed
- Integration of GO Transit Service with municipal transit system is required
- Rouge Valley protection is a major concern

ETOBICOKE

- Metro West/Etobicoke boundary problems
- Rathburn Road extension into Mississauga required

GO TRANSIT

- Generally service level deficiency (not capacity) problems primarily due to sharing of right-of-way with rail freight
- Passenger handling at Union Station is a problem
- Difficulties in meeting demand for parking at stations
- Service coordination of GO Transit service with regional/local transit service
- Modal choice in regions does not favour GO service (strong reliance on auto mode)
- Rail stations need to be integrated more effectively into new development to accommodate nodes
- GO Rail needs to expand from a radial service focussed on Union Station to a GTA wide transportation network
- All day, two-way service to west Oshawa is required, for longer term, extension of service to east side of Oshawa
- Service improvement needed on Stouffville, Richmond Hill and Bradford lines
- Feasibility of passenger rail service on North Toronto Subdivision needs to be assessed
- Lakeshore West service should be extended to Burlington and new stations provided between Burlington and Hamilton
- Off-peak service should be increased on Lakeshore lines
- GO buses suffer delays from traffic congestion

OVERALL WEAKNESSES:

- Road congestion, for example at Durham/Metro boundary, around airport employment areas and Metro employment areas
- Lack of inter-municipal transit coordination within regions
- Transit from regions to Metro (except GO)
- Freeway expansions behind schedule
- GO expansion needed
- Future corridors not protected
- Missing links
- Transit capacity south of Bloor
- Union Station capacity

OVERALL NEEDS/OPPORTUNITIES:

- Improved transit service across Metro boundary
- GO expansion
- Protection of new corridors
- Opportunity for sharing available capacity between different transit systems with

the appropriate amalgamation

- Rail corridors offer some possible alternate transit uses
- GO Transit's current radial system should be diversified (e.g. bus service on Hwy 407) in order to serve other than the downtown core
- Integration of municipal systems with each other and GO Transit very important
- Better interface between GO Transit and TTC needed (e.g. at Dundas West, Main Street)
- Freeway expansion required for provincial highway network continuity/capacity to serve intercity, goods movement and recreational trips.